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ABSTRACT

This document presents a conceptual framework for lifelong education in the USSR that is based on interfacing education on the one hand and the scientific and technological revolution on the other to create a system of lifelong education encompassing basic in-school and other less structured, nonformal programs. The impact of the increasing intellectualization of workers' tasks and the increased knowledge and skill demands that scientific advances have placed on workers are discussed. The development of the Soviet recognition of the need for lifelong education is traced from the USSR's early postrevolutionary period to the present. The principles of purposefulness in education and training, individualization in education, lifelongness, and a systems approach are examined from the Soviet perspective. The role of lifelong education in facilitating workers' physical and spiritual development, raising their sociopolitical awareness, and increasing their vocational qualifications is discussed. A two-tiered model for lifelong education in the Soviet Union, consisting of basic (elementary, secondary, and postsecondary) and supplementary education programs is proposed. The supplemental education portion of the model would feature flexible, nonformal programs that would simultaneously fulfill information-consultation, teaching, and organization-supervision functions. (MN)

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A conceptual framework for the development of lifelong education in the USSR

Alexandre P. Vladislavlev

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Fundamentals of educational planning

The booklets in this series are written primarily for two types of clientele: those engaged in—or preparing for—educational planning and administration, especially in developing countries; and others, less specialized, such as senior government officials and policy-makers who seek a more general understanding of educational planning and of how it is related to overall national development. They are devised to be of use either for private study or in formal training programmes.

Since this series was launched in 1967 the practice as well as the concept of educational planning has undergone substantial change. Many of the assumptions which underlay earlier attempts to put some rationality into the process of educational development have been abandoned or at the very least criticized. At the same time, the scope of educational planning itself has been broadened. In addition to the formal system of schools, it now includes other important educational efforts in non-formal settings and among adults. Attention to the growth and expansion of educational systems is being supplemented and sometimes even replaced by a growing concern for the distribution of educational opportunities and benefits across different regions and across social, ethnic and sex groups. Educational planners and administrators are concerned to take a more systematic attitude towards their social responsibilities. They are learning to act as "conveyer belts" between the classroom (or any other place of learning) and the decision-maker, whether he be found at the local or regional level, at the head of a central department or institution, or in one of its various branches. Their concern is

twofold: to have a better understanding of the reality of education, in its own specific dimensions, empirically observed; and to ensure better analysis and consideration of this reality so as to improve, where possible, the hypotheses that underlie educational policies and strategies for change.

One of the purposes of these booklets is to reflect this diversity by giving different authors, coming from a wide range of backgrounds and disciplines, the opportunity to express their ideas and to communicate their experience on various aspects of changing theories and practices in educational planning.

Although the series has been carefully planned, no attempt has been made to avoid differences or even contradictions in the views expressed by the authors. The Institute itself does not wish to impose any official doctrine on any planner. Thus, while the views are the responsibility of the authors and may not always be shared by Unesco or the IIEP, they are believed to warrant attention in the international forum of ideas.

Since readers will vary so widely in their backgrounds, the authors have been given the difficult task of introducing their subjects from the beginning, explaining technical terms that may be commonplace to some but a mystery to others, and yet adhering to scholarly standards. This approach will have the advantage, it is hoped, of making the booklets optimally useful to every reader.

Preface

Nine years ago the IIEP published a booklet in this series entitled *The planner and lifelong education*, by Pierre Furter. The author, a Swiss academic and practitioner, relied primarily on Western European and North American experience to describe a "utopian model" of lifelong learning and to propose a "framework for research", in order to identify its modes of operation. He concluded by describing the need for learning facilities available to all throughout their lives, which could be considered as a "challenge to the inertia" of conventional schooling.

Today it may be said that in the countries studied by Professor Furter, lifelong education is progressively becoming more of a reality as school drop-outs, unemployed or underemployed adults, and the growing number of retired but intellectually active men or women all seek, and are able to find, responses to their varying educational, training and learning needs.

The planning of such a diversified field of education is precisely one of the main current research themes of the Institute. It is hoped that its results may, within a few years, yield useful methodological and analytical tools needed by central or local planners, by officials of educational programmes and by community leaders.

At the same time, it was felt that too little was known about prospective thinking and system designs concerning lifelong education in socialist countries. This is particularly true of the Soviet Union, where unprecedented achievements in literacy, universal primary and secondary education, and expansion of higher education have taken place, and where the organization of

education beyond the conventional three-tier school system now receives both attention and resources.

Thus, pursuing the Institute's tradition of presenting in this Series novel issues in planning, the IIEP asked Professor Alexandre Vladislavlev, First Vice-President of the All-Union Council of Scientific and Engineering Societies (VSNTO) and an eminent specialist in the design, organization and management of nonformal education programmes, to give his views on the interface between education, on the one hand, and the scientific and technological revolution on the other, which results in a new concept of lifelong education. On the basis of this concept he describes a scheme for the renewal of education as a large but flexible system encompassing school education at its three levels ("basic education") and the variety of other less structured or nonformal programmes ("supplementary education"), which respond to ever-growing, changing and complex needs.

The methodological parallel between Professor Furter's approach and that followed by Professor Vladislavlev should give the reader a broad perspective of the manner in which planning for lifelong education is viewed in different political and administrative conditions and, in the case of the present study, how such planning is likely to become a systemic and institutional reality.

It is the Institute's hope that this booklet will be viewed as usefully complementing the earlier booklet on the subject. While the nature of the *Fundamentals* series normally precludes presentations of national cases, the wider implications of this particular study amply justify its inclusion.

Sylvain Lourié
Director, IIEP

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Introduction

The scientific and technological revolution, which is transforming science itself into a directly productive force, is placing fundamentally new demands on education.

Scientific knowledge is today subject to increasingly rapid revision and renewal, and its practical application, both in production and in all spheres of human and social life, takes place more and more quickly. Until the mid-twentieth century there was an accepted time-span during which the traditional educational system (primary, secondary and higher levels) would give a student the necessary basic knowledge for making practical use of the achievements of science in his future work and, indeed, throughout his whole life. But the scientific and technological revolution is relentlessly shortening this time-span.

As a result, it is necessary to take a fresh look at the long-established patterns and functions of education, and even to rethink its purpose. Preparation for future working life can no longer be regarded as the first and foremost function of education. Schools and higher-education establishments are already finding it increasingly difficult to assimilate the ever more rapidly changing stock of scientific knowledge, or to transmit it satisfactorily to the new generation of specialists.

Side by side, therefore, with the daily increasing convergence of science with production there is an equally growing need to combine education with work, and also to extend education beyond the duration of schooling and into the "post-graduate" period of life—especially into the working period of it. Education is losing its meaning as solely a preparation for what lies ahead.

It must become instead an instrument for a person's constant cognitive adaptation—adaptation both to the increasingly rapid renewal of scientific knowledge and also to the quickening pace at which this renewal is transforming industry and, thus, the content and form of employment itself. This transformation makes it increasingly impossible to provide oneself with a lasting "store" of knowledge. Basic education equips one with general knowledge. On this foundation one now has to select from the broadening stream of scientific achievement the precise specific knowledge required for immediate use in a given workplace, and to master without delay the methods of applying that knowledge in practice. This is the nature of the new cognitive-productive situation.

This state of affairs, however, by no means implies that something entirely different must replace the existing traditional school education system. That system (with some changes, it is true) still has a rôle to play for the foreseeable future; but it is in need of some restructuring—and of some supplementary education. In the writer's view, this supplementary education should merge with basic education to form a single lifelong education system.

Such a system, by reacting flexibly and dynamically to the achievements of science, can become the instrument enabling man to adapt to the whole range of the changes which the scientific and technological revolution is producing in all spheres of human activity. In this context the task of supplementary education will be to channel the torrent of new scientific knowledge which has, so to speak, already burst the banks of basic education and swept it along the path of "extensive development" (courses of greater length, more complex syllabuses, etc.).

This latter approach, besides being economically extravagant, has also proved ineffective from the cognitive viewpoint. Knowledge acquired through the ever-broader curricula of schools and higher-educational establishments often becomes out-of-date before modern science has had time to enrich it with newly apprehended principles. Furthermore, increasing the duration of studies as an independent and unique occupation causes an extremely negative disproportion, by which knowledge, as such, is more valued than its application. Combining education with work, with a particular profession, is a means both of removing

this distortion and also of achieving a better integration of school-leavers, shortening the time it takes them to adapt to working life, fostering better results from their work, and inhibiting possible negative socio-economic consequences.

One result of the present scientific and technological revolution is an increased—or, to be precise, a more fundamental—economic significance being given to knowledge and competence, professionalism and staff qualifications. This implies that the education system and the teaching process in their turn need to be strengthened. Lifelong education seems, to the author, to be the catalyst required.

The necessity for this strengthening does not arise solely from economic considerations; other socio-economic aspects are equally important. In a socialist context an individual cannot feel a sense of integration with society unless his relationships with other members of that society are harmonious. But this is possible only with the support of the most advanced achievements of science and culture. Only on this basis is he capable of integrating himself naturally, through productive labour, through his active and vital position as a citizen, and through mutually enriching interpersonal relationships and cultural life. And in all these spheres conditions are continually and, at times, radically changing under the impact of the scientific and technological revolution.

These are the initial assumptions that have led the author to outline a scheme for the structure and functions of a lifelong education system. The opinions and proposals of Soviet and foreign teachers and specialists in the theory and practice of various types of education have also been taken into account as far as possible.

This manuscript was completed at a significant point in the development of education in the USSR, as the country is rapidly carrying out the Reform of general and vocational education; and the basic standards project for the reconstruction of higher and secondary-specialized education is being widely discussed and improved.

In fact, all these transformations are in reality separate aspects of a single process. The objective was clearly defined by the General Secretary of the Communist Party of the Soviet Union, Mikhail S. Gorbachov, when he pointed out the necessity for

"the creation of a single system of continuous education".[1]

The creation of such a system, then, has been acknowledged as a primary task of importance for the State in the Soviet Union. In the following pages the author attempts to examine, as a hypothesis, one of the possible methods of accomplishing this task.

1. *Proceedings of the XXVII Congress of the Communist Party of the Soviet Union.* Moscow, Politizdat, 1986, p. 48 (available only in Russian).

I. Education in the current of the scientific and technological revolution

Knowledge, education, a qualification—at all times and in all places these have been regarded as the personal property of an individual, guaranteeing him work, material prosperity, and creative and social self-affirmation.

At the crucial turning-point of socialist revolution in Russia this personal property had to be converted into a national, State asset. The country was ruined after the First World War and the Civil War; it was heir to an extremely backward agrarian economy, and two-thirds of the population were illiterate. As Lenin said, it was necessary to turn Russia from a country of bast sandals into a country of electricity.[1]

To achieve such an abrupt shift from backwardness to what, for those times, were modern techniques and technology, the overcoming of general illiteracy was merely the beginning. It was also necessary to produce very large numbers of scientists, engineers and workers who could both create and make use of modern technology. This requirement of Soviet society, in the earliest period of its history, for a qualified and intellectually mature labour force coincided with the natural ambition of each individual to acquire knowledge; it was on the basis of this harmonious combination of State and individual interest that the multi-tiered educational system in Soviet Russia began to take shape.

The economic efficiency of this system was assessed, in its earliest days, by Academician S.G. Strumilin. He showed that

1. V.I. Lenin, *Complete collected works*, Vol. 45, p. 309.

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the benefit resulting from increased labour productivity was 27.6 times greater than State expenditure on education; that this expenditure paid for itself in the first year and a half; and that thereafter, throughout the whole of a person's life, the education he had received resulted in a net profit for the State.[1]

Thus, two decades before the start of the modern scientific and technological revolution, as the country moved over to fundamentally new technologies it was realized that scientific knowledge was the corner-stone of its economic potential. To an ever-increasing extent the efficient use of all the country's resources—natural, raw material, energy, material, technical, financial, human—would come to rely on that scientific knowledge.

Sociological research confirms this principle even today, in the era of the scientific and technological revolution. It has been shown, for example, that each year of secondary schooling raises a worker's labour productivity on average by 30 per cent,[2] and that workers with secondary education learn to master complicated tasks and work-operations 2.5 times faster, and take only half as long to reach the next higher qualification category.[3] In the early 1960s economists estimated that every rouble spent on the State education system resulted in about four roubles' growth in the national income[4]—a significant part of which is thus directly created through raising the educational level of the workers.

The transformation of scientific achievement into a practical asset results from raising the level of qualification of scientists and engineers, workers and production organizers of all ranks. It is the education system's responsibility to ensure this rise, by equipping the working man, who is the driving force of the current scientific and technological revolution, with the latest achievements of theoretical thinking and the means for applying them. By making science a direct productive force this revolu-

1. See V. Seljunin, *This changing world*, No. 10, 1971, p. 151 (available only in Russian).
2. N. Rogovsky, "Improved training for workers", *Kommunist*, No. 16, 1976, p. 54 (available only in Russian).
3. Y.E. Volkov and Y.S. Loshkarev, *Labour education for young people*. Moscow, Politizdat, 1975, p. 81 (available only in Russian).
4. Y. Borisov *et al.*, *The Soviet working class — a short historical essay*. Moscow, Politizdat, 1975, p. 487 (available only in Russian).

tion entails the radical, qualitative transformation of all productive forces.[1] This transformation affects all their component factors: "in the first place, the main productive force in society—man, with his capacity to work, to create material and spiritual values".[2]

The dialectic of the interrelationship between the development of man and the development of science and technology looks something like this: at a certain stage in history, on the basis of the scientific and technological level already attained and of his own potentialities, (1) man in the process of creative scientific activity makes a certain discovery—for example, an invention; (2) he then uses it practically (introduces it into material or intellectual production); (3) as a result, there is an increase in the range of human possibilities (i.e., the preconditions arise for the further development of man himself); (4) new paths are opened for further scientific activity. Such a pattern of forward movement of the cyclical processes of transition from one level of development to another is typical of dialectics, and in principle it recurs at all stages in the historical development of society. But what are the specific features of this pattern in present-day conditions that lead us to speak not merely of progress, of development, in science and technology, but of the scientific and technological revolution?

There are many such features,[3] but some of them are of special importance for the problems we are considering, since they have a direct impact on the functioning of the educational system. It is these features which demand a complete reorientation of the system's activity, to bring it into closer conformity with the requirements of the world today.

The education system is concerned with people, so let us look at the features of the scientific and technological revolution that are directly connected with the human factor. First and foremost

1. G.N. Volkov, *Man and the scientific and technological revolution*, Moscow, Politizdat, 1972, p. 23 (available only in Russian).
2. V.G. Afanasiev, *The scientific and technological revolution, management, education*, Moscow, Politizdat, 1976 (available only in Russian).
3. See, for example, *The modern scientific and technological revolution*, Moscow, Nauka, 1970; *The scientific and technological revolution and society*, Moscow, Mysl', 1973; *The scientific and technological revolution and socialism*, Moscow, Politizdat, 1973; and others (available only in Russian).

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of these is the ever broader and closer link between science and production. In earlier times the development of these two spheres of human activity proceeded to a considerable extent independently. Comparatively little use was made of scientific achievements in production, and the needs of production were hardly ever directly satisfied by the help of scientific achievements. Today, however, a "science-technology-production" system has come into existence, operating with the closest possible interlinking and interdependence among all its three subsystems.

This leads to a number of consequences of extreme importance for a successful education system.

A. Mental and physical work

The "scientification" of production leads to a greater intellectualization of the worker's task, and to a gradual increase in the proportion of brainwork in the overall total of work processes.

The work process, in its most general form, can be defined as the purposeful action of man on an object being processed, using a working instrument in order to arrive at a given (consciously planned) result. Every work process has two sides: the decision—upon what, with what, how, and for what purpose the action is to be exerted (intellectual work); and the action itself, exerted through the physical strength of the actor (physical work).

Under traditional production conditions the worker possessed a finite "package" of knowledge and skills, usually acquired as a pupil. This package was the result not of scientific investigations but of many centuries' experience and a long process of trial and error. Since the range of problems to be solved was comparatively both small and stable, the worker's skills finally became, through long practice, almost automatic; and inellectual work, as a result, occupied only a very small place in the working-time budget.

In due course, by creating machines and production mechanisms, man gradually freed himself from the need to use his own physical energy in the work process. His labour functions were lessened, and the worker moved away from direct manufacture of products to supervision of the machines that produced the

products (the first industrial revolution). This resulted in a rapid increase in labour productivity; but, paradoxically, it left the relationship between the physical and mental efforts of the producer virtually unchanged. He was still the main agent in the technological process, even if no longer the sole agent. He still made use of a standard set of (by now) automatic skills in standard situations—perhaps even to a greater extent than before, as a result of the increased division of labour.

It is true that the proportion of mental work in the production process had increased. New needs—to prepare, organize and perfect the process, to monitor product quality, and so on—had arisen. But this type of work was to a considerable extent separate from the direct production of material goods, and to perform it a new category of employees quickly appeared on the scene. However, the nature of the work performed even by these employees was to a large extent routine; it too usually consisted of a limited selection of standard actions and, generally, did not call for any creative approach.

The scientific and technological revolution is changing this relationship between mental and physical work. Most physical and routine mental work is gradually being phased out, and the worker is now taking his place, in Karl Marx's famous phrase, "side by side with production". Seen in perspective, man's participation in the production process is beginning more and more to take the form of creative work. And in so far as this participation will probably become intermittent and of short duration, his principal activity will take place outside the sphere of material production.

Such an advanced form of intellectualization of work will probably be achieved only in the final stage of the scientific and technological revolution; but the trend towards it can already be seen. The change in the nature and content of work is taking place with growing momentum, and is happening at different levels and along different paths. For the individual it takes the form of an increasing proportion of mental work in the overall working-time budget, and an increasing proportion of creative work in the overall volume of mental work.

In reality, as the transition from mechanized to automated production proceeds there is a marked change in the composition of the workforce. For mechanized production the key work-

ers are the machine-minder, operator and operator's assistant, in whose work physical labour is predominant; those responsible for equipment control, adjustment and repair are considered auxiliary workers. As automation proceeds, however, it is precisely these latter who become the key figures. In the first State ball-bearing factory in which several shops were automated, the proportion of machine-minders and operators fell from 45 per cent to 4 per cent, while that of repair workers rose from 10 per cent to 50 per cent, and the overall proportion of workers in maintenance, power supply and repair departments rose from 12 per cent to 30 per cent. In a similar situation, according to data given by G.N. Volkov, after automation at a number of machine-building plants the overall amount of mental work done by workers rose from 18 per cent to 89.4 per cent.[1]

It should perhaps be borne in mind that in conditions of complex automation the division of work into "mental" and "physical" becomes rather difficult; the frontier between the two is very uncertain. A survey of workers employed on automated production lines at the Likhachev car factory showed that predominantly mental work took up 79 per cent of the overall working hours, and physical work 21 per cent.[2] Moreover, this survey, which related only to people traditionally employed in physical work, described the situation in 1970. The trend towards an increasing proportion of mental work did not stop then; for operation of the same automated production lines in 1980 the figures had already become 85 and 15 per cent respectively.

Such changes as these in the nature and content of work understandably influence the level of educational and vocational qualification of the workforce. Investigation has in fact shown that in the machine-building plants mentioned above the average level of education of the workforce after the change to automated production rose by more than three years of schooling—from 5.7 to 8.8 years.

According to the general statistical data on the educational level of the population of the USSR, the percentage of people

1. G.N. Volkov, op. cit., p. 30.
2. See *The productive forces of socialism in the conditions of the scientific and technological revolution*, Leningrad, LGU, 1974, p. 81 (available only in Russian).

with secondary (incomplete or complete) and higher education among those employed primarily on physical work rose from 32.5 in 1959 to 81.5 in 1984—i.e., almost two-and-a-half times.[1] A similar upward trend has also been noted for vocational qualifications.

In general, the processes of growth in the general and vocational levels of workers' training can be seen to be closely linked. Special studies have shown that to raise by one category the qualifications of a worker with only 5-6 years' schooling takes, on average, five times longer than in the case of a worker with secondary schooling. An even more direct link has been observed between educational level and the performance of mental work: each extra year of general education leads to an average 6 per cent increase in the proportion of rationalizers,[2] while five times more rationalization proposals are made by workers with secondary education than by their workmates with the same length of service but a lower general level of training.[3]

The increase in the proportion of mental and creative work in the production process has led to the emergence of a specific (previously non-existent) social group, the "worker-intellectuals". These are specialists who have completed secondary—and even higher—education and are integrated into the work process as workers. According to calculations made by M.N. Rutkevich on the basis of 1979 USSR census data, "8.7 per cent of workers and 5.9 per cent of collective farmers, as against 3.7 and 2.8 per cent in 1970, had higher, incomplete higher and secondary education. This represents a total of some eight million people."[4] The general trend and extent of this phenomenon are undoubted evidence of the change in the nature of work, i.e., its intellectualization.

1. *The USSR in figures, 1984*, Moscow, Financy i Statistika, 1985, p. 18 (available only in Russian).
2. A widespread category of workers in the USSR, actively involved in improving the equipment and organization of industrial processes.
3. V.A. Zhamin and S.L. Kostanyan, "On the rôle of education and training of staff in a developed socialist society", in *The working class in the world revolutionary process* (statistical materials: collection of articles), Moscow, Nauka, 1975, p. 241 (available only in Russian).
4. M.N. Rutkevich, *The making of socialist homogeneity*, Moscow, Politizdat, 1982, p. 132 (available only in Russian).

Confirming this trend, in 1977 the USSR State Committee on Labour and Social Questions issued a decree on "the listing of the trades of workers in the higher categories" (those for which, in terms of level of qualifications, secondary special education is required). In accordance with this decree, that educational level has become compulsory for highly qualified workers in 380 different jobs.[1]

Creative activity, and other elements of intellectual work, are thus becoming increasingly important in the productive work of people engaged in physical labour; and growing weight is being attached to general and vocational knowledge, and to its relevance to the requirements at a particular workplace and to the trend of foreseeable changes in them.

Another aspect of the intellectualization of individual labour is the changing pattern of time-distribution in the work of engineering and technical workers and office employees—people primarily involved in mental work. Thanks to modern scientific and technical improvements, workers in this category are increasingly being relieved from routine, repetitive and standardized types of work, as such work is taken over by automated or computerized devices. In this process a major part is being played by the creation and use of various kinds of automated management systems. Their development and introduction provide great potential for the increase of creative activity in the most varied spheres of mental work. Automated systems (which, unlike automatic systems, include man as an organic component part) have two major functions: first, to process an enormous amount of information needed for optimum decision-making; and, secondly, to relieve people of such routine tasks as stock-taking, bookkeeping, various standard calculations, etc.

On a nationwide scale, according to an estimate by Academician V.M. Glushkov, "the aggregate number of necessary arithmetical management operations is more than 10^{16} per year".[2] By traditional methods this would occupy no less than ten billion men for one year, working eight hours a day without any holiday or time off—which is obviously absurd. This same vol-

1. *Sotsialisticheskiy trud*, No. 12, 1978, p. 107 (available only in Russian).
2. V.M. Glushkov, *Introduction to automated management systems*, Kiev, Tekhnika, 1974, p. 13 (available only in Russian).

ume of work can be done by a hundred present-day computers, and by only a handful of the computers of the near future.[1] In solving the most important problems for the development of the national economy automated management systems put man on a par with the management process, in the same way as automated production lines in material production. He is now concerned only with such substantial functions as setting and correcting targets and management criteria, introducing a creative element into the search for the best ways of achieving targets, making the final choice and legally registering the chosen solution. He is also responsible for preparing primary data for the system, since it is not always possible to automate completely the collection of such data (for instance, in collecting data concerning the human factor).[2]

This process is developing in two directions. First, the scientific and technological revolution is taking effect not only in the introduction of improved ways of increasing the productivity of intellectual workers, such as automated information retrieval and management systems, but also in the special attention given to the scientific organization of work, which includes every conceivable form of "small-scale mechanization"—the various organizational technology devices (personal computers, electronic microcomputers, photocopying machines, dictaphones, etc.), the production and use of which have spread rapidly in recent years.

Secondly, as might have been foreseen, automation and computerization are now being extended to more and more complicated types of intellectual work, which until quite recently remained in the category of human creative activity. This is true, for instance, in the setting-up of an automatic planning system, and in the emergence of mathematical programmes for demonstrating theories, composing music, solving chess problems, translating technical texts from one language to another, etc.

1. Idem, pp. 13-14.
2. Idem, p. 189.

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B. Labour resources in the scientific and technological revolution

The process of intellectualization of physical and mental work for the individual which we have been considering is beginning to have an effect on the labour resources of the country as a whole. The generalization of individual increments in the intellectual content of work can lead to several results. For example, some jobs traditionally classified as primarily physical work are now clearly changing into work of a primarily intellectual type; some types of physical work are, quite simply, disappearing, and those who performed them are moving into other jobs with a higher content of mental work. The absolute and relative numbers of people employed in mainly intellectual work are growing fast, and among them there is an increasing proportion of people with high qualifications (specialists with diplomas) and, especially, of holders of academic degrees and titles. In overall terms, among people still employed in physical work an increasing proportion have higher general education and vocational qualifications.

The Hungarian research worker M. Simak has described this process in the following way: "The schematic representation of the industrial demand for manpower in the first half of the twentieth century was like a flat triangle, the base of which was the great mass of unqualified workers, with highly qualified workers and scientists at the apex; by the end of the twentieth century the same representation will take the form of a trapezium, widening towards the top, the upper part of which will reflect the growing stratum of highly qualified workers."[1] This is borne out by the assessment made by V.G. Afanasiev, in whose opinion "in fully automated enterprises 40 to 50 per cent of those employed will be qualified workers, 40 to 60 per cent will have secondary education, and 20 to 40 per cent will have higher education; whereas in a typical factory today, from 37 to 87 per cent of employees are skilled or semi-skilled workers, 4 to 8 per

1. M. Simak, *Towards the third millennium*, Moscow, Progress, 1977, p. 340 (available only in Russian).

cent have secondary education, and 1 to 2 per cent are highly qualified engineers."[1]

In one form or another these results can be seen in the changing pattern of manpower resources in the USSR, and they are everywhere apparent in industrial practice. They are also reflected in the national statistics. Thus, during the period between the 1970 and 1979 censuses the numbers of workers employed in intellectual jobs increased by 8 per cent, and in 1979 represented 27.3 per cent of all those employed in the national economy.[2] The growth in numbers of the various job categories, however, was very uneven. A comparison of the results of the 1959 and 1970 censuses shows that among those doing physical work there were rapid increases in the numbers of workers in jobs requiring vocational training—turners (54 per cent increase), milling-machine operators (81 per cent), road transport and electric transport workers (84 per cent), chemical workers (76 per cent). At the same time the rising technical level of production led to a drop in the numbers employed in timber works and lumbering (28 per cent decrease), in agriculture (49 per cent), in mining (15 per cent) and in other poorly qualified or unqualified work.[3] Furthermore, since these decreases were accompanied by a rise in basic production indicators, it is obvious that they resulted from greater labour productivity and, consequently, from the improved qualifications of the workers.

A similar pattern can be seen in the case of those employed on intellectual work. Between 1959 and 1970 their total number increased by 63 per cent; however, the number of specialists more than doubled, and the number of scientific workers tripled in the same period. There was a corresponding drop in the number of less qualified workers: while in 1959 11 per cent of workers in mainly intellectual jobs did not possess even incomplete secondary education (7-8 years), by 1970 the figure was below 5 per cent and by 1981 was only 1.7 per cent.

1. V.G. Afanasiev, *The scientific and technological revolution: socialism, culture, man*, Moscow, Nauka, 1981, p. 128 (available only in Russian).
2. *The population of the USSR: a guide*, Moscow, Politizdat, 1983, p. 162 (available only in Russian).
3. *The population of the USSR: a guide*, Moscow, Statistika, 1974, pp. 154, 156 (available only in Russian).

These changes in the nature and content of work result from the conversion of science into a direct productive force, which is one of the most important features of the scientific and technological revolution. The obvious and persistent trend towards a continuous raising of the intellectual level of working life in the most varied spheres of material and non-material production reflects two aspects of this revolution. It not only generates an immense and unprecedented volume of scientific and technical information, but also requires for its successful development a rapid increase in the numbers of people capable of obtaining this information, spreading it, and—most importantly—using it in practice.

To respond to the demands of society the numbers of scientific workers are increasing at a very rapid rate. The total has risen from 162,500 in 1950 to some 1,462,400 in 1984—a ninefold increase. At the same time there has also been an increase in the numbers in the service industries, and at present 4.5 million people are working directly in the science sphere or in scientific services. If the 9.7 million employed in education are added, we have the enormous figure of more than 14 million specialists (more than in the building industry or in transport) whose basic work is directly connected with obtaining and spreading knowledge.[1]

Similarly, the use of acquired and assimilated knowledge of the latest achievements of science and technology is ceasing to be the privilege of a comparatively narrow circle of people and of a scientific élite. That circle itself, as we have seen, has broadened rapidly; and—most importantly—beyond its boundaries an enormous number of workers and employees are involved in the direct application of modern technical devices and technological processes. If they are to work efficiently an obviously essential precondition must be an adequate level of general and vocational training, giving an understanding of the foundations on which the continuously renewed technology they are using is based.

In his day, Karl Marx pointed out that a worker's vocational skill was the most important factor in labour productivity. He noted that "accumulation of the craftmanship and knowledge (scientific strength) of the workers themselves is the fundamental

1. *The USSR in figures...*, op. cit., pp. 86, 183.

kind of accumulation, and is incomparably more important than the accumulation—which goes along with it and is only a reflection of it—of available and objective conditions for this accumulable activity."[1]

In other words, for achieving maximum labour productivity the important thing is not the availability of knowledge as such, but the assimilation of that knowledge by those participating directly in the production process—the engineering and technical staff and workers. In a socialist context the broad dissemination of scientific and technological, and socio-political, knowledge becomes one of the essential conditions for social progress, and leads to the emergence of a new type of worker. Such a worker possesses craftmanship, a broad professional range of vision, and a thorough knowledge of the polytechnical bases of modern production; he is also able to grasp rapidly the working of the latest machines and technological processes.

From the close link between science and production that is a feature of the scientific and technological revolution two important conclusions can be drawn concerning the functioning of the educational system. The first conclusion relates to the quantitative aspect of educational activity; this activity must be constantly broadened and deepened and enriched with new knowledge, and must encompass larger and larger student populations in more and more general vocational training.

In the years 1970-83 educational expenditure from the USSR State budget and from other sources increased from 19.8 to 33.9 billion roubles,[2] which represented about 7 per cent of the national income.[3] The move towards universal secondary education is virtually complete, the network of vocational technical-training institutes has been reorganized and is constantly growing, and the number of specialists produced by secondary special and higher-education establishments is increasing annually. These trends will continue, aiming at further development of the education system, the more complete satisfaction of the country's need for specialists and qualified workers, and the improve-

1. K. Marx and F. Engels, *Works*, Vol. 26, Part III, p. 276.
2. *The USSR national economy in 1983*, Moscow, Statistika, 1984, p. 549 (available only in Russian).
3. *Proceedings of the 26th Congress of the CPSU*, Moscow, Politizdat, 1981, p. 181 (available in Russian).

ment of all the elements and forms of manpower education and training.

The second conclusion relates to the qualitative side of education. As science penetrates further into production, as mechanization spreads, and as the physical work and the routine mental activities of the worker are increasingly automated, the bulk of working time will be occupied by the non-standard intellectual work entailed in finding solutions to problem situations. However, as soon as activity of this kind becomes—as in some fields it is already becoming—the principal component in the content of work, people will have to be specially trained for it.

To express this in another way, the change brought about by the scientific and technological revolution in the nature of productive work is necessitating qualitative changes in the system of training workers. It must be directed away from the traditional exploratory, illustrative and reproductive functions and towards problem-oriented teaching methods. In earlier times the basic task of teaching was to transmit knowledge from teacher to pupil and to inculcate into learners the ability to use their acquired knowledge according to a set pattern. The teaching, based on the clearest possible explanation of the subject and on training the learner to solve standard problems according to fixed algorithms, was perfectly adequate for the requirements of those days. Under the new conditions, however, the ability to solve non-standard problems creatively is becoming the main purpose of education; the problem-oriented training method, by which the learner (without confining himself within the bounds of canonical knowledge) selects for himself the ways and means of solving a problem, is becoming paramount.

The well-known Soviet expert in pedagogics, L.V. Zankov of the USSR Academy of Pedagogical Sciences, has pointed out that with traditional teaching methods, based mainly on mnemonic devices, one often encounters "an insufficient conscious realization of knowledge and an inability in children to make free use of what they have been taught".[1] Although these words were written about teaching young children in the lower classes of school, the basic idea behind them is just as valid for other learner populations.

1. L.V. Zankov, "But you have to think, as well", *Pravda*, 20 August 1977 (available only in Russian).

The new conditions bring the need for radical changes in the teaching. Its centre of gravity must shift away from the rote learning of rules and principles discovered in the remote past, and from fixed formulas and solution procedures, to an awareness of new ones, discovered by science, and dictated by practice in fields where new knowledge is appearing at an increasingly rapid rate.

To solve a sudden and unexpected production problem it was once enough to recall an analogous problem previously encountered in practice and the corresponding algorithms used for solving it. In the conditions created by the scientific and technological revolution such an approach leads, more and more often, to a dead end; instead, it is necessary to investigate the problem that has arisen and to solve it by finding ways and means of using the continually renewed store of knowledge. This implies that the acquisition of such knowledge has to become an increasingly creative activity, almost in the nature of a scientific investigation. Problem-oriented (or, as they are often called, "discovery-learning") teaching methods are an instrument for readjusting teaching so that it is in line with the basic characteristics of the scientific and technological revolution and with its crucial need for every grade of specialist for an increasingly wide range of jobs.

C. The rate of advance of scientific thinking

If the education system is to work efficiently one feature of the scientific and technological revolution must be given particular attention: the accelerating cycle science-technology-production, i.e., the reduction in lag-time between the generation of scientific ideas, their technological development, and their introduction into production. According to expert estimates, "the gap in time between the making of a scientific discovery and its application in production has decreased from 37 years (equivalent at the beginning of this century to a man's working life) to 9-14 years (one-quarter to one-third of a man's working life today). This means that in the course of his life a man may witness three or four radical restructurings of production processes caused by scientific discoveries".[1]

1. *The scientific and technological revolution and socialism*, op. cit., p. 240.

As a result of the rapid increase in scientific knowledge, and the conversion of a substantial part of it into new technological processes and equipment, the knowledge that a man needs in order to do his work becomes obsolete more quickly. One result is that the traditional manpower-training system, with its unavoidable inertia, cannot as a rule manage to supply its students with the latest scientific and technical information. In other words, if we leave aside the comparatively general and durable scientific propositions and consider actual achievements in the applied sciences, a student leaving even a higher or secondary special educational establishment may well be unable to understand the latest means of production that have just been introduced at the place where he is going to be employed.

Let us assume, however, that we do succeed in reducing the inertia of the educational system—for example, by bringing in as temporary teachers people who normally work at scientific research institutes and are in the forefront of such research, or engineering and technical staff from leading enterprises, who can teach the practical aspects of production at the future workplace with the most modern equipment, etc. As a result, the young specialist will move from education to industry fully equipped with up-to-date knowledge and the ability to use it. But although his training is finished the constant build-up of new knowledge continues. Either as fresh scientific, technological or socio-economic information, or materially in the form of new technological processes and new equipment, it goes on flowing into the production process in a continuous stream. A person who has only the knowledge gained inside the walls of a teaching establishment inevitably falls behind the real needs of production. There is only one means of combating this situation: every worker must of necessity constantly improve his level of qualifications.

It must of course be pointed out that this notion of "improving his level of qualifications" applies only in a very narrow, personal sense. Although the worker is improving his qualifications for himself personally, from the standpoint of society he is not so much improving them (since a later graduate from the same educational establishment will already have acquired the new information) as maintaining them. In other words, whereas without additional training his qualifications would fall behind

through obsolescence, through the continual acquisition of new knowledge those qualifications are kept at a constant level. One might well say to the modern specialist, as the Queen said to Alice in Lewis Carroll's famous story, "Now, *here*, you see, it takes all the running *you* can do, to stay in the same place. If you want to get somewhere else you must run at least twice as fast as that."[1]

Two further demands on the education system stem from this. The nature of specialist training must be such that the specialist is aware that he will need to continue studying even after graduation, and that he should have the possibility of continuously maintaining and improving his qualifications through any acceptable forms of education. The task of education can no longer be one of simply transmitting to learners a fixed amount of knowledge, even through it be acquired creatively. The need is to teach students to learn for themselves, by inculcating in them a taste for active, independent research and for learning and assimilating new knowledge. Every worker must be ready to play the part of the "eternal student", whose whole life is a continuous quest for knowledge.

But merely to inculcate in people the habit of self-education is not enough in itself. The scientific and technological revolution has generated an "information explosion". Self-education now comes up against very great difficulties, mainly connected with the existence of a huge quantity of redundant information—loud "information noise". In almost every branch of science and technology thousands of books and articles appear every year, hundreds of papers are read at symposia and conferences, there is an active exchange of pre-prints—in short, every branch is characterized by a turbulent flow of information. But this flow contains, side by side with important and original information, a great deal of second-rate material and much duplication as well. It is often extremely difficult, if not impossible, for a specialist to sort out the wheat from the chaff. The education system itself must create forms of guidance and selection, so that the task of obtaining new knowledge is not left entirely to the individual student.

1. L. Carroll, *Complete works*, London, The Nonesuch Press, 1977, p. 152.

An essential condition for the further successful development of society is the creation of a rational network of supplementary-education institutions. This in no way implies that such a network should be strictly formalized and regulated. On the hypothesis that in all citizens a predisposition for the lifelong renewal and replenishment of their knowledge has already been formed (this is, in fact, an extremely complicated and separate problem, the individual aspects of which will require special examination), the main purpose of all supplementary-education institutions is to provide all those who so wish with maximum possibilities for education and self-education.

Citizens in a socialist society must be provided with the broadest choice of forms and content of supplementary education, fully in keeping with their individual wishes and requirements, and regardless of the level and nature of their previous training. The supplementary-education subsystem, in providing this choice, will become an essential part of the life of every Soviet man and woman.

D. Education and the structure of knowledge

The third feature of the scientific and technological revolution, which also exerts a powerful influence on the functioning of the education system, is the continuous process of change in the subject-structure of science. This is reflected in the constant tendency towards both differentiation and integration of scientific trends. In the words of Academician B.M. Kedrov, "at different stages in history one or other of these two tendencies may prevail, and does in fact prevail, but it never happens that one entirely squeezes the other out. At the present time both these opposed tendencies are revealing more and more clearly that they are conditional upon one another, since an increase in one of them brings with it an increase in the other."[1] As a result of the close link between science and production the changing subject-structure of science influences the branch-structure of the national economy, and this in turn affects the job-structure of the demand for workers. Soviet industry comprised 172 branches in 1944, 256 in 1959, and more than 300 in the 1970s—

1. B.M. Kedrov, *The classification of the sciences*, Vol. I, Moscow, Nauka, 1962, p. 9 (available only in Russian).

in thirty years the number of branches had virtually doubled. The job-structure of those in employment followed the same pattern.

But the increase in the number of different jobs is by no means the only problem that arises in this connection. The development of the economic machine can lead to the division of a particular job into two or more separate jobs; the appearance of new jobs where there were none before; the merging of several jobs in one; or to the disappearance of certain jobs. Every year in the national economy about 600 new jobs appear, and about 500 old ones disappear. And besides this changing pattern of jobs themselves, there are constant changes in the numbers of people needed by the national economy in almost all of these jobs.

These developments are demonstrated, for example, by the pattern of graduates from higher-educational establishments in the USSR. In 1948 the list of specialities in these establishments totalled 319; in 1967 the figure was 413 (not counting 433 special fields of study); in 1973 there were already 452 specialities and some 600 special fields, while in 1980 the number of special fields of study had risen to over 1,000.[1] Furthermore, this increase reflects not only differentiation but also integration of knowledge; for instance, such specialized fields as physical chemistry, engineering psychology, biophysics, mathematical linguistics, and so on reflect the need for specialists capable of working at the "interfaces" between different disciplines.

There has also been a noticeable change in the structure of demand for specialists in the different sciences. It can probably be assumed (with some reservations) that the job-structure of higher-education graduates reflects the needs of the national economy. But even within the aggregate structure of the graduates in 23 groups of specialities where there has been a significant rise in numbers, the pattern for different vocational groups is very uneven. Between 1970 and 1975 the aggregate number of graduates rose by 13 per cent. However, the number of graduates in cultural subjects rose by 75 per cent, and of these the number

1. M.A. Ivanova and I.A. Samarina, *Technical progress, the structure of the scientific and technological revolution and the employed*, Moscow, Ekonomika, 1970, p. 51; V. Elyutin, "The first duty of higher education", *Kommunist*, No. 10, 1981, p. 44 (both available only in Russian).

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specializing in cultural and educational work rose two-and-a-half times; the number of law specialists rose by 62 per cent, and of specialists in consumer-goods technology by 41 per cent. Over the same period the number specializing in agriculture and forestry fell by 8 per cent, in radio technology and communications by 5 per cent, and in chemical technology by 4 per cent.

Analysis of the changes in the job-structure of higher-education graduates is not our concern. What is important in the present context is the obvious fact that behind the specialities and specialized subject fields we have been discussing stand real educational institutions, and that the pattern described above is only a reflection of the bigger changes that are occurring in these institutions themselves.

The differentiation and integration of science, refracted through the prism of social production, compels higher-education institutions to make continual readjustments—sometimes by introducing additional specialities, sometimes by reducing the list, sometimes by increasing or reducing the number of students in a certain speciality, or even by doing away with a speciality altogether. Each of these changes demands a great deal of organizational work. This in turn frequently has serious implications for the teaching staff (they have to restructure themselves, and the staff structure itself has to be restructured). It also complicates student guidance: it sometimes happens that those who enter one insitution leave a different one—at least in content, if not in name. All these changes have a serious effect on the functioning of higher education. But there are no grounds for hope that these difficulties will disappear or even that they will be substantially reduced. They are a reflection of the growing contradiction between trends in the existing education system towards a standardization of teaching work, and the requirements of modern production, which ideally requires individual training of workers for each individual place of work.

The increase in the number of specialities and special disciplines that we have been considering results from the attempt by the education system to respond to the needs of production. But any further development of this trend within the existing forms will prove to be a blind alley; even at the end of the 1960s, in more than a hundred specialities (not counting the further subdivision into special subject fields), higher-education institutions

were producing only 15 to 100 graduates,[1] and a continuation of the growth in numbers of specialities will lead to a further reduction in the size of the respective groups. At the same time, an increase in the flexibility of the education system and an attempt on its part to achieve greater individualization of teaching is becoming a vital need at the present time, and, in the opinion of A.A. Lyapunov, represents "the most general consequence of the scientific and technological revolution".[2]

While sharing this view, it is worth noting that achieving individualization of education is obviously possible only within the framework of a lifelong education system. In such a system only the general comparatively standard foundations of knowledge (broad-profile education) are included within the confines of higher education, the more or less narrow refinement of the speciality and its adjustment to the requirements of a specific workplace being achieved through close contact between the higher-education establishment and the corresponding firms or, more likely, in training that comes after higher education.

To conclude our survey of the impact of the scientific and technological revolution on education, certain of its consequences must be stressed. The most important of these is that a man may be, as it were, snowed under by an avalanche of knowledge. An assessment of the information explosion mentioned earlier, in the form of an analysis of the quantity and volume of publications in the form of books, pre-prints and various types of periodical, has shown that there is a twofold increase in the amount of scientific and technical knowledge approximately every 8-15 years.[3] Even taking the longest time-span, and assuming that approximately half the published information is not new or is duplicated, the result is that each successive generation (i.e., every 25 to 30 years) has available twice as much knowledge as the previous generation. Consequently, there must be an equivalent increase in the capacity of the education system to digest

1. M.A. Ivanova and I.A. Samarina, op. cit., p. 47.
2. A.A. Lyapunov, "The mathematization of knowledge: problems and consequences" in the collection *Number and thought*, Moscow, Znanie, 1972, p. 32 (available only in Russian).
3. See, for example, V.V. Nalimov and Z.M. Mul'chenko, *Scientometry*, Moscow, Nauka, 1969, p. 31 (available only in Russian); M.K. Simai, op. cit., p. 340; V.G. Afanasiev, op. cit., p. 113.

this new knowledge, sift out what is essential, and present it in a suitable form for assimilation by the learner.

New knowledge, like that acquired earlier, is by no means a useless burden. The reduction in lag-time between a discovery and its practical application, which we discussed earlier, leads to a situation in which the material world surrounding man undergoes rapid and continuous changes. In a period of five to ten years more than half of the names of goods produced by industrial firms change, and among the new names we often find entirely new products, which have no earlier counterparts at all.

Max Born, the famous German physicist, who was born in the nineteenth century, said at the end of the 1960s that at present "there are countless things which when I was young belonged to the world of fantasy ... there were no cars or aeroplanes, there were no radio communications or radio receivers, there was no cinema and television, there were no conveyor-belts and mass production. All this has become a reality before my very eyes, and has led to economic and social changes in the lives of people that are deeper and more fundamental than anything over the last ten centuries of past history."[1]

Even Born's list (and it is naturally far from complete: there is no mention of computers, plastics, tape-recorders, air-conditioners, pocket calculators, and many other things) shows that the innovations of the last few decades have extended not only to the production sphere but also to the sphere of everyday life. The scientific and technological revolution shrinks space and stretches time, so that each inhabitant on our planet is constantly aware of what is new not only in his immediate surroundings but also in the world as a whole. In a typical household today a great variety of technical devices can be found—sometimes quite simple ones (a gas or electric cooking-ring, an electric iron, a blender, a washing-machine, a vacuum-cleaner), sometimes very complicated ones (a colour television, hi-fi record-player, tape recorder, loudspeakers, electronic calculators, still cameras and movie cameras, refrigerators). To cope with these domestic appliances a number of skills are needed, and to be capable of doing even some uncomplicated repairs one must have some

1. *Literaturnaya gazeta*, 26 May 1979 (available only in Russian).

sufficiently reliable knowledge, which must moreover be continually updated through education or self-education.

This short analysis of the consequences for the education system of the present-day scientific and technological revolution demonstrates that we are concerned not only with a further improvement of the functioning of that system, but also with the need for a thorough restructuring of the whole sphere of activity in this field. The satisfaction of all the demands made by the scientific and technological revolution on the education system is possible only if we abandon that view of education which sees it as a period of preparation for life itself. Rather, the facts of life today impose the necessity of adopting the concept of lifelong education: an education that accompanies man throughout the whole of his conscious life.

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II. The concept of lifelong education

The idea of education as accompanying a man throughout his whole life was not unknown in earlier times. It appears in the works of the ancient scholars of India and China, of outstanding teachers (Y. A. Komensky examines pedadogy as a whole, i.e., as the theory of the education of children, young people and adults), and of well-known figures in culture and science. Thus, as Jack London writes in one of his letters, "the purpose of the university is to provide a preparation for subsequent learning, for continuous study throughout life", and Goethe has defined the same idea even more clearly: "our predecessors could be satisfied with the level of education they had received in their youth. But we must take up our studies again every five years if we do not want life to leave us behind." However, whereas in the past lifelong education was general only among the members of a cultural élite, representing an extremely small part of society, today it has become necessary for practically everybody, regardless of social position. The modern scientific and technological revolution thus imposes the democratization of education, and also the combination of education and work.

This was clearly foreseen by Lenin. In a polemical argument with the famous ideologist of the Russian Populist Movement (Narodism), S. L. Yuzhakov, he maintained that "neither education and instruction without productive work, nor productive work without education and instruction in parallel, could be placed at the high point required by the present-day level of technology and the state of scientific knowledge."[1] The first

1. V.I. Lenin, *Complete collected works*, Vol. 2, p. 485.

Soviet People's Commissar for Education, A.V. Lunacharsky, asserted that a cultural state can be so only in so far as it is a profoundly educational one, in which each generation is more educated and cultured and more fully developed than the previous one, and that this can happen only if there is continuous instruction, if there is learning at all stages of life.[1] N.K. Krupskaya also devoted much attention to lifelong education, especially adult education (then known as "out-of-school education") and self-education. As early as 1922 she wrote that "... schools have the task of giving children a certain sum of knowledge and skills that later make self-education possible".[2] Such well-known teachers as E.N. Medynsky, K.D. Ushinsky, V.I. Charnolussky and others were also attached to these ideas.

The concept of lifelong education is the natural and logical outcome of two factors: the rapid growth in the extent of adult education, which in one form or another today extends to almost all those employed in the national economy; and the recognition of the very close bond between children's education and adult education. For all practical purposes these are links in a single chain: adult learning is always to a considerable extent based on knowledge obtained in traditional schooling, and adult education itself, by the mere fact of its existence, can and should have a strong feedback effect on the forms, methods and purposes of traditional education.

In accordance with this, experts recognize three stages in the development of lifelong education in Western European and American educational theory.[3]

To begin with, discussion centred mainly on adult education, which was identified with lifelong education and was seen as a relatively unexplored area of pedagogical theory and practice. A special conference devoted to adult education was held at Cambridge in 1929. Later, after the Second World War, similar con-

1. *Problems of lifelong education in modern conditions of social progress and of the scientific and technological revolution*, Part I, Moscow, Znanie, 1981, p. 22 (a collection of conference papers, available only in Russian).
2. N.K. Krupskaya, *Pedagogical essays*, Vol. 3, Moscow, Pedagogika, 1959, p. 25 (available only in Russian).
3. *Problems of lifelong education in modern conditions of social progress and of the scientific and technological revolution*, Part II, Moscow, Znanie, 1981, p. 3 (available only in Russian).

ferences under the leadership of Unesco took place in Elsinore (1949) and Montreal (1960).

Understanding of adult education began to develop, and around the mid-1960s, instead of being regarded as a kind of appendage to the traditional education system, it came to be recognized as an independent (sometimes even leading) area of educational activity and, subsequently, as a subsystem of the more general lifelong education system, uniting and binding children's and adult education more closely together in a single continuously operating process.

At this stage the main discussion was no longer on the issue of the length of lifelong education—it was clear that it must in fact continue throughout a person's life—but on issues of content and form. Some authors saw it as including not only organized teaching, but more generally any ways of supplementing knowledge, and even the normal process of a person's experience of life. As a result, the concept of lifelong education became somewhat diffuse. By contrast, in the third stage of development, from the beginning of the 1970s to our own day, special attention has been given to resolving theoretical problems involved in the concept, in an attempt to give it greater rigour and clearer definition. This was the way in which issues were presented at the Third International Conference on Adult Education in Tokyo (1972), where attention was focused on the problem of lifelong education.

Since that time international co-operation under the auspices of Unesco has become a key factor in adult-education development, both in evolving a modern scientific conception, and in promoting exchanges of experience derived from practice. The Recommendation adopted at the Nairobi General Conference in 1976 greatly contributed to an understanding of the rôle and place of adult education in the education system as a whole, and to an appreciation of its aims and purposes and of the organizational forms it can take in different socio-economic settings. Since then Unesco has returned to the subject of adult education at the Adult Education Conference in Paris (1985). The proceedings of these Conferences have enriched the theory and practice of this highly important educational subsystem. It is also hard to overestimate the work done by the International Council for Adult Education in collecting, summarizing and distributing

material on the experience of non-governmental organizations in this sphere.

Side by side with the attempt to define more sharply the content of lifelong education there has been a growing awareness of its close interrelationship with productive work, which has led some theoreticians to define lifelong education as a dynamic process made up of successive periods of productive work and education. While sharing in principle the idea of a broad integration of learning and productive work (which will be given special consideration in the next chapter), we shall nevertheless concentrate our attention more directly on the educational problems in the education-production complex.

A. Ideas and concepts

The principal idea underlying the concept of lifelong education is the realization of the fact that a person's education, and his general and vocational training,[1] are not merely a stage when knowledge is accumulated for later "real life", but one of the permanent forms of the whole life-process of the individual. The concept based on this idea acknowledges learning to be a normal and necessary human activity at all periods of a man's life. It therefore entails the opportunity and necessity for people at any age to use, refresh and update their earlier-acquired knowledge and abilities, continually to broaden their outlook, to raise their cultural level and develop their capacities, to acquire and advance in a speciality, and even to acquire a new speciality.[2]

We define lifelong education as a systematic and purposeful activity aimed at the acquisition and improvement of knowledge, abilities and skills, conducted in any type of general or special educational institution and/or through self-education. We shall thus regard the lifelong-education system as a most general concept, including within it pre-school establishments, day, evening and external school courses, various vocational- and technical-education institutions, day, evening and external secondary-special and higher-education institutions, post-graduate

1. In this context the term "training" is not very apt, but because of its wide usage we shall take it as synonymous with "learning".
2. F.V. Dar'insky, "Lifelong education", *Sovietskaya pedagogika*, No. 1, 1975, p. 18 (available only in Russian).

courses, institutes, faculties and courses for the improvement of qualifications, the political and economic education system, the people's universities, lecture cycles and courses, as well as the rest of the organizationally established types and forms for the acquisition of knowledge by each and every socio-demographic and vocationally qualified group of the population.

In order to structure the lifelong-education system and group the existing types and forms of instruction together into more or less coherent subsystems it is useful to employ two criteria, one of them relating to the learner population and the other to the forms of instruction proper. The first criterion will be employment in the national economy of students enrolled in a specific form of education. From this angle, educational institutions can be divided into two groups: (1) those where the students are not employed in work in the national economy (excluding pensioners), and (2) those where studies are being pursued, outside normal working hours, by people who are employed in some branch of material or intellectual production. In line with the terminology widely used today we shall call instruction given in institutions in group 1 child education (this includes young people and adolescents), and instruction given in institutions in group 2 adult education (including under this head young people studying outside working hours in evening classes or through external courses provided by general-education or vocational-education institutions, as well as those sent by their firms on release courses).

The second criterion is less sharp, and is linked to the social and professional status of the educational institutions concerned and to the rights enjoyed by their graduates. From this angle too educational institutions can be divided into two groups: (1) those which give basic, fundamental training, graduation from which signifies completion of a definite stage of education, and (2) those which give further training, graduation from which does not lead directly to any marked changes in the student's social situation or way of life. The institutions in group 1 (they are sometimes described collectively as the "traditional", "school", "formal" or "state" education system) include pre-school institutions, general-education schools of all kinds, vocational-technical and technical institutions, secondary-special and higher-education institutions, and post-graduate institutions.

This is what we call "basic education". In group 2 we place all institutions for improving qualifications, people's universities, lecture halls, courses, the political and economic education system, self-education activities and other similar forms of instruction. These together are what we term "further education".

It should be noted that both these proposed criteria are of a temporary nature. They reflect the present state of the educational system and, as time goes by, they will clearly lose their force. We have more than once mentioned the need to bring education into closer relationship with productive work. This process is already happening, and in the scheme for a lifelong-education system described below productive work becomes an indissociable accompaniment of instruction in practically all spheres of education. In other words, all pupils and students (except perhaps the very youngest) will simultaneously be participants in the world of work and, as a result, the distinction between "child" and "adult" education in the sense referred to above will disappear.

It is also becoming more and more difficult to distinguish between educational institutions in terms of the second criterion. Even now one can notice the considerable influence on the status of specialists of certain forms of post-graduate instruction, and on the situation of workers of the longer refresher courses. The process is natural and inevitable, and in all probability it will go yet further, to the point where basic- and further-education institutions converge into a single lifelong education system. As was pointed out in 1972 at the Third International Conference on Adult Education, "the final proof of its success... will come when one no longer speaks of school and out-of-school education but only of lifelong education.[1]"

The combined use of both criteria enables us to classify the elements in the lifelong-education system and to determine its basic subsystems.

As we can see from Table 1, there will be four such subsystems. The first will include state education institutions giving citizens basic education, mainly before they enter the manpower

1. *Adult education in the context of lifelong education.* Third International Conference on Adult Education. Paris, Unesco, 1972, p. 16, para. 60. The use made here of the terms "school" and "out-of-school" education largely corresponds to what we have called "basic" and "further" education.

TABLE 1. Classification of educational institutions

	Student population	
	Child education	Adult education
Basic	Pre-school institutions, day schools, technical colleges, day courses at technical and vocational colleges, secondary-special and higher-education institutions, day post-graduate courses.	Evening and external schooling, evening and external courses in secondary-special and higher-education institutions, post-graduate correspondence courses.
Further	Circles, studios, sections, lecture-halls, people's universities for young people.	The system for improvement of qualifications (institutes, faculties, courses, schools, lectures). People's universities, general-education courses, lecture-halls, etc.

pool of society.[1] These are the kindergartens and day nurseries, day schools, teaching institutions in the vocational-technical education system, day secondary-special and higher-education institutions, and internal post-graduate courses.

People in these institutions may, concurrently with basic education, acquire further education in the second educational subsystem. For pupils in pre-school institutions this may take the form of music lessons, painting or other kinds of artistic creativity, swimming, figure-skating, etc. The opportunities open to children are constantly increasing. Technical circles, circles organized by the VSCAAFN (Voluntary Society for Collaboration with the Army, Air Force and Navy) for teaching various skills, classes in people's universities, literature or drama studios, and other forms of further education are available to millions of schoolchildren. As for pupils in vocational-technical colleges, and especially students in secondary-special and higher-educational institutions, almost every type and form of further education is open to them (except the improvement-of-qualifications courses and vocational refresher courses).

1. A certain comparatively small proportion of this population consists of people entering a permanent educational establishment after a period spent at work (*stazhniki*).

It is generally accepted that by no means all adults will have managed to attain an adequate level of basic education by the time they enter working life. A large number of teaching establishments exist for such people, and together form the third subsystem: basic adult education. This subsystem includes external secondary schooling, evening and external secondary-special and higher education, external post-graduate studies—in short, all the traditional educational institutions in which studies are pursued outside normal working hours.

This subsystem, which aims to compensate for the shortcomings of child education, now accounts for a comparatively small proportion of overall adult education. Of the 55 million adults receiving one of the various forms of instruction in the 1983/84 academic year, only 8 million were receiving basic education. Of these, 4 million were students at evening or external secondary schools, the number of which has fallen by nearly 20 per cent over the last ten years and will evidently drop further as the transition is made to general-secondary education and as the student population of secondary vocational and technical colleges increases.

At the same time, there is a continual increase in the number of people attending the various institutions in the fourth subsystem, further adult education, which includes the courses, institutes and faculties for the improvement of qualifications, the universities of various kinds of political studies, the people's universities of various types, lecture halls, lecture cycles, self-education and other forms of further education.

Three groups of teaching institutions can be distinguished within this subsystem, according to the make-up of the student population. Group one covers institutions where the teaching is intended for specialists who have previously completed secondary-special or higher education. The bulk of this group consists of the faculties and institutes for improvement of qualifications and certain types of people's university, and the group as a whole is often referred to as Post-graduate education. Group two is intended for factory workers, collective-farm workers and office workers who do not possess degrees or diplomas, and it includes such forms of study as the schools of communist labour, schools for skilled workers, courses leading to a new type of job, and certain types of people's universities. Finally, group three con-

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sists of institutions whose courses do not make any severe demands on the students in terms of vocational qualification and level of education; in other words, they are intended for the broadest strata of the population. These are, in the first place, the people's universities, and also lecture cycles and individual lectures aiming to popularize various socio-political and scientific issues of our time.

The foregoing list of subsystems and their individual components must not, however, be taken as demonstrating that a well-coordinated, efficiently operating system of lifelong education already exists. This may perhaps be true as regards traditional education (the first and third subsystems in the terminology we have adopted).[1] But in the area of further education there is still little co-ordination between the work of the majority of the components. On the one hand, this leads to frequent duplication in the subjects studied; on the other, it does not permit complete coverage of all the real requirements of the national economy and of the people generally.

In our view, each and every educational institution must achieve an internal balance between the requirements of the whole lifelong-education system (in which it must in some way be integrated) and the requirements of the undertakings and organizations which are directly interested in using its students and which sponsor its work. The first set of requirements usually imply that each student move to a qualitatively new and higher educational and cultural level; the second set are usually requirements of a more local and practical nature.

The relationship between these two sets of requirements can of course change, depending on actual conditions; but in one form or another the duality is likely to exist in any educational institution. In practice, however, it is not unusual to find courses for the improvement of qualifications, or refresher courses, in which the teaching is aimed at narrow, strictly utilitarian goals con-

1. Here too, incidentally, there are still examples of lack of co-ordination and duplication; e.g. pupils who graduate from secondary-special educational institutions and enter higher education in the same speciality, and have to study certain disciplines all over again. The same applies to students from schools providing good industrial experience when they move on to the corresponding vocational-technical college, etc.

fined to the requirements of one isolated factory, shop or even workplace. This is not education: what is happening is that workers are being "taken for a ride", so to speak, in a way that has no effect whatever on their general educational and cultural level and is of no help at all to their future development. In such cases the recurrent changes in production processes call for great efforts in manpower retraining, and such primitive and repetitive instruction, despite its seemingly rapid results, in fact causes an unreasonably large amount of time, energy and resources to be expended on staff training.

This state of affairs results principally from the fact that there is as yet no generally accepted view as to what form of instruction should provide the basis for further education. Consequently, a large number of heterogeneous types of educational institution exists, the majority of them with different departmental structures and established practices. They set themselves differing aims and purposes, and have to cope with different student populations. In our view, however, many of the purposes of further (and not only adult) education could be achieved in a form of education such as the people's universities: these, we believe, could very well provide the model upon which all the highly dispersed (albeit to some degree effective) educational elements might be reshaped and, together with the traditional institutions, welded into a single system of lifelong education for the people of the USSR.

It is important to note that the need for constant study in order to achieve vocational and spiritual betterment is fully in line with modern psychological thinking. Until quite recently there was a theory of the development of the personality, widespread especially in western psychology, according to which the psychological formation of an individual occurs mainly during childhood and youth, has as its aim the achievement of a mature, adult state, and then virtually ceases. However, a great deal of psychological research in recent years has led to the conclusion that such a viewpoint "must be radically revised and replaced by another one, based on the proposition that the development of the human personality is infinite, and that development is the basic means of existence of the personality, especially at the present level of socio-economic life. The period of mature personality cannot be seen as some final state towards which the

psychological and social development of a person is directed and with which it ends."[1]

Research on people of mature years has revealed in them a transition of their intellect to a higher level, at which they become more likely to find creative, non-standard solutions to the problems facing them, based on a broad range of interdisciplinary knowledge accumulated by association. Though they sometimes go far beyond the comparatively narrow frame of the immediate problem, they not infrequently come up with original and extremely valuable solutions. Furthermore, there develops in them a capacity not only for finding creative solutions but also for independently posing complex problems.

However, such transitions of the intellect do not occur spontaneously, they are possible only as a result of constant intellectual activity, the most important component in which is lifelong education. It is precisely within the framework of lifelong education that something resembling permanent training and development of an individual's mental capacities may occur, fostering a maximum realization of his potential.

In describing the concept of lifelong education a mere statement of the principal underlying ideas is not sufficient. It is very important also to set out the main principles embodied in the concept and to consider its fundamental aims, functions, possibilities, problems and prospects. Before embarking on this task, however, let us clarify the interrelationship between the concepts of lifelong education and of *basic* (all levels of pre-school, school and higher) education.

The structure of the national education system is defined in the Fundamentals of Legislation of the USSR and of the Union Republics on National Education, and in the Decree of the USSR Supreme Soviet "concerning the main lines of the reform of general and vocational education" adopted in 1984.

At present this structure comprises five successive stages: preschool education; incomplete secondary education; complete secondary education (general, vocational and special); higher education; and post-graduate education.

1. L.I. Antsyferova, "The psychological laws underlying the development of the personality of an adult and the problems of lifelong education", *Psikhologichesky zhurnal*, Vol. I, No. 2, 1980, p. 53 (available only in Russian).

1. Pre-school education covers children from 4 months to 6 years of age. The educational institutions concerned are crèches (up to age 3), day nurseries (from 2 to 6), kindergartens (from 3 to 6). At the end of 1983 there were 15.5 million children in these institutions. The numbers of children increase with each successive age-group, so that the majority of youngsters in the 5-6-year range, especially in urban areas, receive pre-school training in kindergartens.

   This last point is particularly important: the transition to schooling that starts at age 6 (instead of, as formerly, 7), as laid down in the Reform, is to be made gradually over a number of years, starting in 1986. Consequently, to start with, "a proportion of children will enter school at 7 and schooling for 6-year-olds will follow the same curriculum in schools and in top classes of kindergartens."[1]
2. The next stage is incomplete secondary schooling, which is compulsory for all children. It consists of two stages: four-year primary schooling for children from 6 to 10 years of age, followed by grades V to IX for those between the ages of 11 and 15.

   Primary schooling teaches reading, writing, arithmetic and basic work skills. For the next five years pupils study the rudiments of science and receive general work training. In the last two years there is a range of options: pupils can study various subjects chosen from physics-mathematics, chemistry-biology or general humanities branches.
3. At the end of the single-type compulsory nine-year schooling pupils coming from incomplete secondary education have a choice of four ways of completing secondary education. Some of them will continue into grades X and XI of general-education schools, where in addition to general education they receive initial vocational training and, within the limits of their capabilities, take part in socially useful productive work. Others may enter secondary vocational-technical colleges (VTCs), the single type of teaching institution into which—under the Reform—all the former types of vocational-techni-

1. See *National education in the USSR: collection of documents 1917-1973*, Moscow, 1974, p. 93; *On the reform of general and vocational education: collection of materials and documents*, Moscow, 1984 (both available only in Russian).

cal institution, including those that previously did not offer secondary education, have been converted. Education in secondary VTCs normally lasts for three years, after which students matriculate as skilled workers with complete secondary education.

After grade IX it is also possible to go on to another type of institution, the secondary-special education institutions (technicums, pedagogical and medical colleges, etc.). The courses last four or five years, and students matriculate from them as qualified specialists and organizers for the lower rungs of the industrial ladder.

The last avenue open to students from incomplete secondary education is to start work in industry and complete their education outside working hours. The country has a network of evening (shift-working) general-education schools from which the successful student can matriculate with the secondary school-leaving certificate.

A student may also enter a technical college or secondary-special education institution after completing grade XI, but in this case the course duration is naturally shortened, in technical colleges usually to one or one-and-a-half years and in technicums to two or three years.

4. Those who successfully complete general-secondary education, either in a school, VTC or secondary-special institution, can pursue their studies in institutions of higher education, either institutes or universities.

Secondary-school certificate-holders, if they pass the entrance examinations, are enrolled in the first-year course and after five or six years of successful study move on into the various branches of public industry as highly qualified degree-holding specialists.

Courses in higher- (as well as in secondary-special) education institutions are either full-time, or part-time for working students. In the latter case two kinds of courses are held: evening classes, where students attend two to four times a week ouside normal working hours, and courses which are in a sense formalized external studies. The student follows the course independently throughout the term, and attends the institute only to sit for the examinations, for which the State will grant him fully- or partly-paid leave.

5. After completing the basic course in a higher-education institution some of the students will go on to do post-graduate studies leading to an academic degree, thus qualifying as high-level scientific workers. Here again studies may be internal (three years) or external (four years). Post-graduate students who pass the necessary examinations and successfully defend their theses are awarded the first higher degree (*kandidat* of sciences).

Diploma-holders are offered the opportunity constantly to improve their professional qualifications. There is an extensive network of sectoral and intersectoral institutes for the improvement of qualifications (IIQs), under the aegis of practically every ministry. In addition, in many higher-education institutions there are faculties with a similar purpose (FIQs). In general, diploma-holders are released from work and seconded to an IIQ or FIQ for a period of several months to acquire new or additional knowledge connected with their professional work.

These are the general features of State educational institutions in the USSR; the system is of course supplemented by a variety of different kinds and forms of public education organizations.

It can be seen from this list that although certain types of adult education (evening and correspondence courses in schools, in technical colleges and in higher-education institutions) are in fact included in basic education, and although in Article 3 of the Law on Education production training and the improvement of workers' qualifications are mentioned as well, national education is nevertheless a narrower concept than lifelong education. This is borne out by Article 12 of the same Law, according to which "national education bodies and institutions shall assist in the organization of the self-education of citizens", self-education being understood as such forms of education as "people's universities, lecture bureaus, courses, schools of communist labour and other public channels for the dissemination of political and scientific knowledge"[1]—i.e., various types of supplementary education.

1. *Principles of the legislation of the USSR and the Union Republics concerning national education; National education*, op. cit., p. 94.

B. Guiding principles

Let us now look at the principles that are especially relevant in the context of lifelong education.

1. The principle of purposefulness in training and education
This principle is mainly a methodological one, and serves as a basis for establishing the boundaries of the lifelong-education system. Within the confines of basic education the principle is automatically observed: all institutions in this subsystem, and the basic activities of the students in them, are in the first place governed by the notion of purpose-oriented training and education. But when educational activity moves out beyond the framework of specialized educational institutions the boundaries between education as such and the more general processes of unorganized development of the individual, accompanying him throughout the whole of his life, no longer exist.

Needless to say, in the process of living each individual constantly acquires new knowledge, skills and abilities, develops his own system of moral and ideological values, and builds up and enriches his social and productive experience. But the process of acquiring knowledge cannot always be equated with education. Although the process of acquiring everyday information (e.g., where a certain film is being shown, what are the doctor's consultation hours, how much does a certain book cost, etc.) does add to a person's knowledge, it cannot be regarded as an educational process in the true sense. Moreover, a great deal of new knowledge is acquired by people accidentally, as it were, as a "by-product" of every-day living—for instance, the rules of personal intercourse, standards of behaviour in different circumstances, various kinds of unsystematized general information, and so on.

A criterion is therefore necessary to distinguish between a person's educational activity and the more general process of his formation and development. And obviously, only the conscious purposeful acquisition of knowledge, and the selection of knowledge that serves the all-round development of the individual, can be regarded as education in the sense of the continuous shaping of the personality.

A person who likes entertainment may frequently go to the

cinema to see comic films, but this is not education in the true sense of the word. But when, for example, he follows the film cycle "The history of Soviet Film Comedies from the Twenties to the Seventies", in which the films are presented in chronological order and by producer, and are accompanied by verbal information provided by qualified lecturers, his activity does become a form of lifelong education. In the same way, when a person goes for a walk in the town or the country he is simply taking normal relaxation; walks with a purpose, along a predetermined route (especially in the company of an experienced guide), are transformed into an educational process.

It is precisely in this way that what we call a "hobby" can become the main business of a man's life. For the great mathematician P. Ferm (1601-1665), one of the discoverers of the theory of numbers, a jurist by profession, mathematics was for many years a mere amusement. Academician A.P. Borodin of the Academy of Medical Surgery took time off from chemistry to amuse himself by writing music—music that was later to become one of the glories of Russian art. K.S. Alekseyev was a talented engineer, industrialist, and owner of a large firm. After falling in love with the theatre he started appearing in amateur performances; he then began to devote the greater part of his time to that art, and under the pseudonym of "Stanislavsky" distinguished himself as an outstanding actor, teacher, producer and theoretician of the theatre. In this way distraction is transformed into attraction, and attraction into the main business of life, purposeful creative activity.

2. The principle of individualization of education

This principle is concerned with the uniqueness of each individual personality, on the one hand, and the necessity for maximum development of the intellectual potential of each person, on the other. It therefore demands not only a special approach to, and methods of, teaching, but also an educational content which is unique for each member of society. It should not be confused with the individual approach to education, which is usually taken to mean simply that the particular set of methods which is most effective for his training and education should be selected for acting upon a particular pupil.

The individualization of teaching is one of the demands made upon lifelong education. The concept of finite education, which drew a sharp dividing line between training for life (in particular, working life) and life itself, resulted in the appearance of a certain gap between the content of the training a student had received in the education system and the requirements of the particular workplace for which he was destined. The educational system did not know exactly where the student would be working or exactly what functions he would be expected to perform; its curriculum therefore aimed at producing a standard type of specialist, able to adapt himself within a fairly broad spectrum of workplaces. This suited the system of production: the standardization of the training of specialists in any particular field meant that they were in a sense interchangeable, and this made it easier to select and place workers.

To overcome the gap, an attempt was made at the outset to train specialists of a narrow type, able to comply fully with the requirements of a given workplace as soon as they completed their studies. However, the problems of planning their training and then finding jobs for them in the overall setting of the scientific and technical revolution, with the constant change in the content of work that that entails, proved insuperable; and this approach was abandoned in favour of the training of specialists of a broad type. The gap could now be overcome during the period of adaptation of young workers and specialists: for graduates from higher-education institutions, for example, this period was usually from one to two years.

The gap we have been considering can be fully overcome, however, only in a system of lifelong education. Lifelong education is, in theory, able to abolish the boundary between the period of training and the period of working life and to establish the closest possible link between training and the requirements of production, at the same time ensuring that the specialist can give of his best in his job immediately on completion of his training.

The specialist training of students can be broadened even further within the framework of basic education, by transferring their specialization to the sphere of supplementary education and determining its content directly by the requirements of the workplace. The training itself can be given either in industry or

in a specialized educational institution which works in accordance with the direct requirements of industry.

The principle of individualization of training is closely linked with the need for a change in attitude towards students, who must be seen not only as the objects, but also as the subjects, of training. This attitude becomes particularly important and relevant as the general educational level, qualifications and experience of life and work of the students rise. Although the need for such an approach has long been recognized by Soviet educators the influence exerted by students on the content of the knowledge they receive, not only at school but also in secondary-special and higher-education institutions, is still extremely small.

In recent years there has been a great increase of optional courses. The purpose of these courses is to permit a certain degree of individual training. The existence of a broad range of such courses in the majority of specialized educational institutions within basic education could well change the existing situation, by providing the required flexibility in educational content. But despite their undoubted value, optional courses are as yet only a half-measure, in that while they provide for the inclinations of the students themselves through freedom of choice, they do not always take account of what the specialist will need in his place of work.

In this connection lifelong education, as a system for raising qualifications in various branches of socio-political and cultural training, can come to the rescue. Adults studying in this system have a much greater choice of the forms, methods and areas of teaching than do schoolchildren and students, and this in itself makes it much easier to satisfy their requirements and interests. For the teaching process adults as a rule choose independent work, subjects for discussion, and so on. But in addition, as practical workers who, unlike schoolchildren, know what knowledge they need, they can exert an influence on syllabuses and on curricula either independently, or through the appropriate public organizations (especially the councils of educational institutions) or firms.

In this way the principle of individualization of training, strictly centred on the concrete purposes of production or the creative purposes of the individual, is achieved.

3. The principle of lifelongness

This principle may sound strange in the present context, but it has been deliberately included in the list of principles in order to allow discussion of some misunderstandings that may arise in interpretations of lifelong education. The term is in fact used with three different meanings. The lifelongness of education may relate to a given individual: in that case it implies that, without any prolonged interruptions, he is continuously engaged in purpose-oriented learning activity, including both training in various kinds of educational institution and self-education.

The term can also be used to describe the system of lifelong-education institutions. It then means that the system concerned represents an unbroken continuum of institutions. In other words, in this case it implies an education system organized in such a way that training can be given in any subject field, and that for any such field a chain of teaching establishments can be established so as to form a close-knit, vertical, hierarchical sequence with a high degree of continuity.

The term is perhaps most frequently used to refer to each individual man and woman as a separate person. This, basically, is the interpretation of it by V.N. Turnenko, who sees it from several possible angles, such as:

a) the relevance of the process of acquiring knowledge to life itself;
b) the constant renewal of the content of knowledge;
c) the unity between training for life and life itself;
d) the permanent character of revolutionary changes in education;
e) the continuous nature of the process of transforming education into self-education.

On this basis he distinguishes the following components of the lifelong-education system:

a) pre-school education institutions;
b) secondary- and higher-education institutions, where students study without discontinuing work;
c) secondary- and higher education institutions that give in-service training;
d) institutes of vocational training and re-training, not connected with the formal raising of educational levels;

e) institutions of the club type, involved in educational activity;
f) the mass media used for educational purposes;
g) self-education.[1]

Other points of view are encountered as well. For instance, the Polish experts Z. Lyudkevich and Yu. Pultuzhitski point out that "lifelong education consists not so much of an unbroken process of education as a change in the aims and purposes of the individual elements in the teaching system of such a kind as to allow lifelong education to have its maximum effect..." They rightly consider that this effect must be "... much more significant than the sum of the results achieved by the individual components in education. If this condition is fulfilled, we can then say that the principle of lifelongness in the education system has been achieved."[2]

4. The principle of a systems approach to education

In discussing the various aspects of the concept of lifelong education we have on more than one occasion used the expression "lifelong-education system". The use of this phrase is no accident. What we are discussing is not merely improving the work and increasing the numbers of various types of educational institution, or extending their activity, but in precise terms the creation of a system of lifelong-education, for which the organizing principle and basis for construction must be the systems approach.

If we take an artificial system to mean a certain number of interconnected elements set up in order to achieve certain definite goals, and if we bear in mind that in the present case we are talking precisely about the setting-up of an artificial (i.e., not a natural) system, in developing that system we can make use of the basic rules governing complex systems. Let us consider these rules.

1. V.N. Turnenko, *The problems of lifelong education in modern conditions of social progress and of the scientific and technological revolution*, op. cit.
2. Z. Lyudkevich and Yu. Pultuzhitski, "Lifelong education and approaches to the modernization of content and methods of training in institutions of higher learning", *Sovremennaya vysshaya shkola*, No. 4, 1974, p. 73 (available only in Russian).

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(a) The suboptimization rule states that local optimization of any one of the subsystems does not in the general situation lead to optimization of the system as a whole. Moreover, the excessive development of any one or more subsystems may worsen the functioning of the system as a whole.

Thus, too strong a development of one kind of educational institution, without regard for its influence on other kinds, will mean that the positive effect is transformed into its opposite and may affect the system as a whole. We know of many examples where a child gets too good a schooling in kindergarten (improvement of the "pre-school-education" subsystem) and then goes on to another school which has remained relatively unchanged. In the beginning he finds the work too easy in his new school, and consequently does not acquire the habit of continual study. The result is that when he has exhausted the knowledge and skills acquired in kindergarten he starts to encounter difficulties and to drop behind in his studies. This in turn often produces a sense of inadequacy (having a lower opinion of himself) and complicates the normal process of education and development. A similar situation has also been observed when there is excessive enthusiasm in senior classes for optional subjects which include elements from the higher-education courses that will be followed subsequently.

On the other hand, students frequently experience difficulties when they come up against discovery-learning methods (an improvement in the "higher-education" subsystem) if during their earlier general schooling they were mainly taught by the explanatory illustrative method of teaching.

The need therefore arises to bring all branches of the education system from pre-primary to post-graduate simultaneously into line with present-day requirements. It is time for suboptimization—for such changes in each subsystem, each separate unit of the educational system, as will lead to optimization of its functioning as a whole.

(b) The low-probability-phenomena rule states that the system must not be organized to deal with situations that have a low occurence-probability (that are rarely encountered), for it may then prove too complicated to be viable and efficient. Such situations arise, for instance, in secondary schools, who have to

educate simultaneously, in the same school and in the same class, a large group of "average" pupils, and at the same time some very gifted ones and some comparatively backward ones. The strong pupils either break out of the normal framework (and skip a grade) or have their development held up. Alternatively, if there is too much concentration on the backward pupils the general rate and level of development of all the pupils is lowered.

Another example of violation of this rule can be found in the excessively detailed listing (already referred to) of specialities and special subjects for students in higher education. It reflects the wish to satisfy as far as possible *all* the demands of the national economy for specialists, even in types of job which do not differ greatly from one another. A situation has arisen where in certain specialized fields the training of specialists is almost completely individual and "tailor-made", while the number of specialities and special types of training has reached almost 1,000. As a result, when they enter employment only about 70 per cent of young engineers, for instance, start working in their own field of specialization. The race to satisfy minor demands has so complicated the subsystem that it has begun to have a negative effect on its efficiency.[1]

(c) The centralization rule (relationship between centralization and decentralization) in decision-making. This should not be regarded as an absolute rule. Complete compliance with it is possible only in conditions where there is a high degree of centralization in all three components of the process: the collection and processing of information, the means of communication, and the decision-making methods. A criterion for correct selection of the level of centralization is the ratio between (a) the required speed of decision-making and (b) the actual speed with which information reaches the centre, is processed there, and returns in the form of a sufficiently effective decision. It is

1. It should be noted that this problem, which cannot be solved within the "higher-education" subsystem, finds a solution inside the whole system of lifelong education. In this context higher education has the function of providing fundamental knowledge, and the various forms of supplementary post-graduate education assume the functions of training for the changing requirements of any particular workplace.

obvious that the actual speed of decision-making must not be less than the required speed; if it is, the decision will be taken late and the effective working of the system will be endangered.

Unfortunately, this is exactly the situation at present in basic education. Within this system decisions regarding changes in various elements (lists of specialities, the nature of specialist training, the content of training, and so on) often lag behind national economic needs. In contrast, the substantial decentralization of supplementary education makes it possible for people's universities, for instance, to change their syllabuses and substantially renew their teaching staff annually if necessary, and sometimes even in the course of the year. These forms of training prove more effective because they behave in accordance with the laws of a system that adapts itself automatically to the learning requirements of students. This shows the advantages of the lifelong-education system (integration of basic and supplementary education) over its individual components, within which individually it is impossible to solve the problems of manpower training and the development of the personality at a level concomitant with the present-day needs and possibilities of society.

The significant successes of basic education in the USSR have been the marked extension of the network of educational institutions and the enrolment in them of the most varied groups of the population. These successes have paved the way for an even fuller satisfaction of the growing demands made upon the general educational, vocational and cultural level of the Soviet people. In other words, conditions have arisen in which a system of lifelong education can work efficiently, and the setting-up of such a system is now a major aim of State policy in education.

Some changes in the already existing types and forms of basic and supplementary education for children and adults, and a tightening of the close interrelationship between them, could provide the foundations for the lifelong-education system. There is much ongoing research and debate, both among scholars studying educational problems and among practitioners in this field. All the indications are that a system of lifelong education will undoubtedly be set up in the USSR in the comparatively near future.

C. Aims and purposes

As a preliminary to defining the aims of lifelong education, some consideration should be given to the purpose of the existing system of basic education. This purpose is clearly defined in the Principles of Legislation on Education:

> "The aim of national education in the USSR is to train highly educated, fully developed, active builders of communist society brought up on the ideas of Marxism-Leninism, in a spirit of respect for Soviet laws and socialist law and order, and with a communist approach to work, physically fit and capable of working successfully in various spheres of economic and socio-cultural construction and taking an active part in the life of society and the State, ready selflessly to defend their Socialist Motherland, to cherish and increase its material and spiritual riches and to care for and protect nature. National education in the USSR is called upon to foster the growth and satisfaction of the spiritual and intellectual needs of Soviet man."[1]

All these requirements must be fulfilled within the system of lifelong education too, but that system has other purposes as well. The purpose of the present system of national education is to prepare a person for life—i.e., for the achievement, first and foremost, of an initial correlation between the level and quality of a specialist's training and the requirements of the job he has chosen. In other words, basic-education institutions prepare a person, in the first place, to enter working life; further growth in the potential of the personality usually occurs outside these institutions. And although Article 45 of the Principles of Legislation on Education deals with the need to improve qualifications, this Article refers to specialists, and the improvement of their qualifications is seen mainly as part of the system of higher education.

Under present-day conditions, however, this is not enough. Today it is not only specialists who wish to raise their qualifications, but also factory workers, collective-farm workers, office workers—representatives of practically all job-categories. Moreover, an immense amount of work is constantly being done to improve the socio-political and general cultural level of the

1. "The principles of legislation of the USSR and of the Union Republics concerning national education", in *National education in the USSR*, op. cit.

Soviet people, as well as to give them vocational training and training for work in public life.

All this broad range of activities must be covered by the system of lifelong education. In describing the purposes of that system, therefore, we must bear in mind constantly the need to raise the socio-political, vocational and cultural level of every Soviet man and woman. Purpose-oriented educational activity must be available to all citizens, regardless of their age or of the level of training they have reached.

The tasks of each rung on the national education ladder are listed in the Principles of Legislation on Education: pre-school education (Article 14), general-secondary education (Article 19), vocational and technical education (Article 21), and secondary-special (Article 36) and higher education (Article 41).[1] These tasks, which are connected mainly with forming in students a Marxist-Leninist outlook on life and equipping them with sufficient knowledge and skills for their subsequent studies or work, must unfailingly be carried out in the lifelong-education system as well. But in this system other tasks are to be added to them: first, to ensure that there is a correlation between the vocational, socio-political and cultural training given and the changing requirements of the social environment; and, second, to ensure that real opportunities are available for forming and satisfying the continually growing spiritual requirements and demands of Soviet citizens.

On this basis, we can lay down the following basic aims for the system of lifelong education:

1. *Provision for the spiritual and physical development of the rising generation, by fostering the all-round education of people who are capable of dealing with the complex problems of the present day.* To achieve this the many and various endeavours of all the different teaching establishments in the basic-education subsystem must be joined together. We need, too, a proper understanding of what is meant by "all-round education" of the individual in terms of the scientific and technological revolution, and what new features this revolution has introduced into our understanding of what constitutes a socially mature and vocationally active individual.

1. *National education in the USSR...*, op. cit., pp. 96, 97, 99-101.

As already pointed out, one of the necessary conditions for the formation of a harmoniously developed personality is bound to be the creative reformulation and thorough mastery of the fundamental laws of nature, of the laws governing the development of human society, and, finally, of vocationally useful knowledge. But this is no more than a necessary condition. It will obviously be insufficient unless it is accompanied by the formation of an active and vital personal attitude in the individual, including a certain feeling of "information-hunger". It is this that constantly impels a person to try to broaden his outlook and deepen the knowledge he has already acquired. Under present-day conditions, as was pointed out at the 25th Party Congress, when the volume of knowledge that a man needs is growing sharply and rapidly, it is no longer possible to stake everything on the acquisition of a definite "package" of facts. The important thing is to instill in a person the ability to supplement his own knowledge independently, and to find his bearings in the headlong stream of scientific and political information.[1]

The main purpose of basic education, therefore, is to stimulate in every possible way the learning activity of students. They must be encouraged constantly to add to their knowledge, forming their taste for creative unstereotyped activities, and cultivating in them an ability to think independently and to build up their intellectual potential.

For this purpose, various methods of active learning have been widely used in secondary and higher education. One of the most important teaching techniques of this nature is the discovery-learning method: this calls for the active involvement of learners in the process of acquiring new knowledge, and leads to the formation and development of creative thinking and a thirst for knowledge in the student.[2]

The discovery-learning method is gaining wider and wider popularity as one which fully satisfies present-day requirements. A survey among experienced teachers with an average of some twenty years' service has shown that about 50 per cent

1. *Proceedings of the 25th Congress of the CPSU*, Moscow, Politizdat, 1976, p. 77 (available only in Russian).
2. Cf. *A dictionary of psychology*, Moscow, Pedagogika, 1983, p. 276 (available only in Russian).

of them see "the main trend in improved teaching methods in the development of the discovery-learning method and in stimulating the learning activity of students".[1] The main emphasis in secondary education is no longer on the acquisition of definite empirical material, memorization being the principal aim, but on the encouragement and development of abstract, analytical and theoretical thinking.

In higher education, similarly, active teaching methods are being used to stimulate independent work and develop creative thinking: the students are guided towards the investigation and solution of problems, and, most importantly, the process of acquiring new knowledge becomes an everyday need. In lectures, for example, instead of giving a detailed exposition of the whole course (often glossing over those parts of it which have been insufficiently investigated), the lecturer now sets out the principal and most complicated problems only, and in so doing devotes attention precisely to the controversial and poorly researched areas. The proportion of time spent on lectures themselves decreases, and there is a corresponding rise in the number of seminars and the amount of practical work done by the students.

In colleges, greater and greater use is being made of various devices for the "industrialization of education", i.e., a broad range of all kinds of technical teaching aids. These include various information and teaching machines, audio-visual devices, closed-circuit television systems and cable television, games, training aids that stimulate industrial situations more or less closely, computer technology, which offers the possibility of programmed learning, and many other technical devices.

By making students think for themselves, all these methods and techniques not only help them to acquire and retain the immense volume of knowledge necessary for the worker today; they also carry out one of the most important tasks in training a person for future lifelong education. For throughout his life he will constantly have to acquire new knowledge and skills, and deepen and broaden his intellectual awareness.

1. I. Zverev, "Teaching methods in secondary schooling", *Narodnoe obrazovanie*, No. 3, 1976, p. 125 (available only in Russian).

The capacity constantly to acquire knowledge must be built in to the system of lifelong education, it must be promoted by the system, and must dictate its further responsibilities

2. *The continual raising of the level of socio-political awareness in the broad masses of workers, the deepening of their knowledge of Marxist-Leninist philosophy and political economy, of the policy of the CPSU and of the practice of building communism, as well as of the international situation and of the principles underlying life in the USSR.*

Fulfilment of this responsibility has always been at the centre of the Communist Party's activity. In the words of Lenin, "developing the awareness of the masses is, as always, the basis and the main content of all our work".[1] This sphere of activity has today assumed very great proportions: every year, some thirty million people are enrolled in various Party and Komsomol study systems alone. The lifelong education system is thus placing a foundation of scientific knowledge at the disposal of men and women called upon to participate in the management of collectives and of industry, as well as in the affairs of society and of the State. Equipped with that foundation, increasingly large numbers of citizens are taking their part in public life. Some 2.3 million people are elected, at various levels, to the Soviets of Working People's Deputies; more than a million active workers are constantly engaged in the various organs and commissions under these Soviets. Millions of people are in elective offices in Party, Komsomol, trade-union and other public organizations. Since these people are all elected for fixed terms and then replaced by others, the majority of Soviet people undoubtedly take part at some time in their lives in the activities of the various elective organs.

Over three million people are members of the All-Union Society *Znanie*. Every year they deliver about 27 million lectures, attended by more than one-and-a-half billion people.

An important part of the socio-political life of the individual is his work and his scientific and technological activity. Tens of millions of workers take part in the work of permanent conferences on production, public offices for economic analysis, public laboratories, design offices, scientific research insti-

1. V.I. Lenin, *Complete collected works*, Vol. 13, p. 376.

tutes, councils for the scientific organization of work, scientific and technological information bureaus, and so on.

There is a large-scale activity on the part of inventors and rationalizers. In 1983 4.9 million proposals were submitted by 4.6 million of them, and in the same year the savings resulting from the introduction of inventions and the adoption of rationalization proposals amounted to nearly seven billion roubles. The All-Union Society of Inventors and Rationalizers has more than six million members; over five million people belong to many other scientific and technological societies.

All in all, there are thus millions of people in the USSR who need various kinds of qualifications—sometimes extremely high and specific, often calling for vocational training—in order to perform their public duties successfully and to carry out their practical, social, scientific and technical activities.

3. *Changing the vocational qualifications of workers.* The large-scale work of renewing, deepening, broadening and redirecting the vocational training of working people, often summed up under the general heading of "improvement of qualifications", represents a completely new type of educational activity which is very typical of the present stage of educational development. The constantly changing demands made by material and intellectual production on the pattern of labour resources, in terms of educational content and level of qualifications, make it imperative to set up a network of educational institutions of a new type. In these, the vocational-qualification pattern of labour resources must be brought in line with the ever-changing demands of the national economy under the influence of the scientific and technological revolution.

The argument is sometimes put forward that a specialist who has had a good basic vocational education can and must himself increase his knowledge independently. There is also no doubt whatsoever that good special education is altogether necessary, just as necessary as the personal readiness of the specialist to add to and renew his knowledge. But let us consider one simple case—incidentally, not an uncommon one.

An engineer, for example, with an excellent education, will have to use in the line of work the apparatus of applied mathematics, or "come to terms" with computer technology, or make use of techniques of management psychology. Virtually

none of these fields will be familiar to him. These disciplines appeared in technical colleges only after he had completed his education. In each of these new areas of knowledge over 2,000 publications appear every year in the USSR alone. Is our specialist in a position to choose by himself from this mass of publications the ones that he really needs?

More and more people, more and more frequently, are finding themselves in this situation—economists and psychologists, biologists and physicists, philosophers and doctors. Moreover, the study of "new" disciplines does not as a rule form part of the syllabus of courses for the improvement of qualifications. Indeed, it can hardly do so, since the assimilation of any one of them would call for independent study in its own right.

J. Bruner, in a book entitled *The psychology of knowledge*, writes that "the physicist Robert Oppenheimer, talking one day about the sharp increase of knowledge in our time and the difficulties of mastering it, remarked that although he could not read all the publications of other scholars, he could find out about them through personal contact with the scholars themselves". Perhaps the most interesting thing about this statement is that although the proposed method is not suitable for mass audiences, it is nevertheless a very constructive one. Personal contacts undoubtedly enable one to avoid or at least substantially reduce the amount of "information-noise" that comes with the overwhelming majority of scientific publications. Apart from genuinely new facts, these usually contain a great deal that is already known: it is generally acknowledged that the increasing flow of information (i.e., printed materials) far exceeds the actual increment in knowledge. Soviet research workers estimate that in the second half of the twentieth century the quantity of scientific information will increase by about thirty times, whereas the volume of scientific knowledge will only double.[1]

Such a situation clearly shows the vital importance of the various forms of lifelong education aimed at improving the

1. V.I. Matirko, "Theoretical problems concerning the periodicity of raising staff qualifications", in *Problems of organizing lifelong education for leading workers and specialists in the national economy* (collection of papers read at the All-Union Conference), Moscow, 1981, p. 60 (available only in Russian).

qualifications of adults. At the same time, an enormous amount of work to reduce the level of "information-noise", to separate the wheat from the chaff, falls on the shoulders of the teachers and lecturers, who are specialists in their own respective fields of knowledge.

A worker's situation a few years after his completion of traditional vocational education is one of an increasing gap between the constantly increasing quantity of new knowledge relevant to his job, and the level he reached at the end of his training. As time goes on that level is constantly going down, relatively, because part of the knowledge he obtained during his education becomes obsolete, and also because he simply forgets those parts that he does not use directly in the course of his working life.

This gap has particularly unfortunate consequences if a "leap" occurs in the given job to "a new level of professional *Weltanschauung*". In such a case, as time goes on "the categorical network of disciplines is transformed, their link with other disciplines changes, the place of a job in the national economy changes, and the place of people employed in a particular type of work changes as well."[1] Under the influence of the scientific and technological revolution such leaps are occurring everywhere. In electronics, there is the transition from vacuum tubes to semi-conductors and later to solid-state technology; in metal-working, the transition to electric-arc welding, the introduction of lasers and programmed machine-tools; in medicine the use of endoscopy and computer-assisted tomography (CAT).

It is here that a flexible, well organized network of institutions for improving the qualifications of working people must come to the help of the specialist in overcoming the deficiencies that arise. This network must achieve the following purposes:

(a) It must provide periodic information for workers regarding the latest achievements of science and technology, which they need to know about if they are to perform their official duties or do their work properly. This kind of activity is sometimes called "up-dating" knowledge and skills: in fact, it is a matter not so much of improving qualifications as of maintaining

1. L.I. Antsyferova, "The psychological laws...", op. cit., p. 57.

them at a certain level. If we suppose that basic-education institutions have a relatively low level of inertia, the students who emerge from them will enter industry already equipped with the latest knowledge and skills. As a result, their qualifications will by comparison be not lower but higher than the qualifications of those who left these institutions earlier and progressed through up-dating courses (though these latter will, of course, have the benefit of practical experience as well).

(b) It should offer a more thorough study, compared with basic education, of one or more disciplines strictly focused on the latest needs of a particular kind of work. This kind of training, usually called "further training", corresponds more closely to the notion of "improving qualifications", since in this case the level of professional knowledge and skills does in fact become higher than as a result of traditional education. Further training of specialists usually takes place in faculties for the improvement of qualifications in higher-education institutions, in institutes for the improvement of qualifications in one or more branches of industry (branch and inter-branch institutes), and through various courses, whereas further training of workers takes place in schools of advanced methods of work, institutes of advanced experience, etc.

(c) It should broaden vocational qualifications, i.e., familiarize workers with disciplines they have not studied earlier but need to know in connection with their practical work. A worker's capabilities, which result from the knowledge and skills acquired during basic education, do not always suit the requirements of a particular workplace. This may be the result of a discrepancy between education in a speciality and the nature of the work itself, or because of the existence of certain specific features at the workplace which cannot be taken into account even in the most exhaustive list of types of basic training. These matters are usually dealt with through special cycles of lectures, various forms of economic studies (when economics and management sciences are concerned), people's universities, and a part of the branch institutes for improvement of qualifications. The syllabuses in the faculties and institutes referred to in (b) above are as a rule designed to provide further training for specialists within the job they have already taken up.

(d) It should enable workers to change their field of specialization, either because the demand for workers in a given job decreases (or even because the job has disappeared altogether), because of an unforeseen need to provide workers for a new branch of industry, or, finally, because of the unsuitability or reluctance of a particular person to work in the special field for which he qualified earlier. Retraining of this nature has become frequent in recent years, owing to the rapid rise in job mobility among people employed in both material and intellectual production. For ordinary working people this retraining is usually given in training courses for second jobs, while other categories of workers obtain fresh qualifications through individual self-education, lecture courses, people's universities, evening faculties or staff-retraining courses in higher-education institutions.

(e) It should help to raise the general level of education and culture of the Soviet people. The importance of this task is demonstrated by the investigations of S.G. Strumilin mentioned earlier. Calculations by his group have shown that 27 per cent of the growth in national income of the USSR was the result of an improvement in the level of education and culture of working people. Admittedly, this figure refers to the mid-1960s, and the method by which it was obtained is open to some criticism: various authors give different (though quite high) values for this indicator. But there is undoubtedly a close link between the level of education of the working population and the rate of growth of the national income. According to calculations made by S.L. Kostanyan, for example, the proportion of the national income resulting from education and the improvement of worker's qualifications was 27.5 per cent in 1970 and rose to 30 per cent (156 billion roubles) in 1975. There was an identical rise in the "yield" from education, which according to the same calculations amounted in 1970 to four roubles for every rouble spent and in 1975 to 4.13 roubles, while for each percentage point rise in the average level of education of workers between 1960 and 1975 there was approximately 2.5 per cent growth in national income.[1]

1. *The economics of national education*, Moscow, Prosveshchenie, 1979, pp. 204-205 (available only in Russian).

The creation of a lifelong-education system, and especially that subsystem of it which covers adult education, is also one of the ways towards a rational solution to the problem of free time—which, in the words of Karl Marx, is "the yardstick of the wealth of society". "The very notion of free time", to quote a leading article from the newspaper *Pravda*, "is a social phenomenon, which cannot be seen in a narrow sense merely as 'rest' or the organization of rest. When a person goes to the theatre, a museum, a library, a lecture, his enthusiasm for them is not rest in a pure form, but work, a change of occupation, the process of apprehending knowledge. All this is interconnected. And the formation and development of a harmonious personality is possible only when there is unity between the component parts of human time—hours of work, entertainment and rest."[1]

One of the ingredients in the improvement of the general educational and cultural levels of the Soviet people is precisely this fostering and satisfying of the constantly growing and many-sided interests and spiritual requirements of the citizens. This is undoubtedly an important factor in the forming of an all-round developed personality. "To a certain extent, it can be said that a person is what his needs are, for a person's pattern of needs reflects in concentrated form his inclinations in terms of life and values. It follows from this that by controlling the process of formation of reasonable needs in the members of society, it is possible to affect their inclinations in life and their all-round development."[2]

Another important element in culture, to which special attention should be devoted, is the cultivation of interpersonal human relationships. Psychologists recognize the existence of two types of intellect: one more attuned to the "man-material environment" system, and one more attuned to the "man-man" system. It is often found that a person who is completely in his element in various scientific fields (e.g. the natural sciences or technology) nevertheless loses his self-assurance and commits many errors in even the simplest of everyday situations, where he is faced with social and psychological factors and needs to

1. *Pravda*, 22 February 1970 (available only in Russian).
2. Kh. F. Sabirov, *25th Congress of the CPSU on the formation and development of a developed personality*, Moscow, Znanie, 1977, p. 40 (available only in Russian).

interact with the attitudes of the people around him. This is not surprising, since as a rule he has not been taught how to behave in these circumstances. He may, indeed, have been brought up to believe that there is nothing to be learned in this respect, or that it is impossible to learn anything because success in interpersonal relationships is, so it is said, an inherent, inborn property of the personality.

Such a belief is to no small extent encouraged by the exclusion of psychology from secondary-school courses and its unjustifiable absence (together with sociology) from the curricula of the majority of higher-education institutions. A sense of human relationships can undoubtedly be taught, as is clear from scientific findings in social psychology and the sociology of personality, adult psychology, industrial psychology, etc. Of course, not everyone is capable of reaching the highest levels in this, any more than in any other branch of human activity. But everyone can and should possess at least the most elementary skills in leadership and subordination, in persuading others and accepting opposite points of view, in collective work and joint relaxation, as well as in many other forms of interpersonal intercourse. In the context of a developed socialist society, where group activities are becoming predominant and labour collectives are proving to be one of the most important elements of the social structure, the development of these skills is an urgent responsibility for lifelong education.

In other words, the solving of the problems described in the foregoing paragraph completes, in a way, the full circle of the work of forming the personality, from its beginnings in the child-education subsystem and through its continuation, by evening and extra-mural training in basic-education institutions, by means of lectures and studies arranged by various cultural institutions, and in people's universities, throughout the whole of life.

D. The problems that arise

Lifelong education has become an all-embracing necessity. The scientific and technological revolution, which is causing such rapid changes in man's technical equipment, as well as in the

material world around him and in the interrelationships between people and the natural environment in which they exist, calls not only for growing social responsibility on the part of each member of society, but also for a more competent kind of behaviour, both in the workplace and outside it. But without the constant and purposeful acquisition of new knowledge improvement is impossible. The increasingly rapid replacement of old knowledge by new has one unavoidable result; the worker can no longer "rest on his laurels", relying on the diploma he once obtained, though this may have been at the highest educational level and even with distinction.

Post-graduate education is the only way in which a worker can adapt to the changes we are experiencing. These changes affect his working life and his everyday situation: they affect the interests of his fellow-workers and those of society as a whole. Everything now depends on the competence and qualifications of literally every working person, and on the smooth co-ordination of his activities with the efforts of all other participants in the production process.

The specific problems of further education must now be considered. Of course, the readjustment of the basic-education subsystems that precede it also deserves the closest attention from specialists in pre-school, school and higher education, as well as from research workers in a broad range of related fields, but we shall hardly touch on these aspects.

The first point that must be emphasized is that even the most efficient rules and methods used in higher education cannot simply be transferred bodily into post-higher education.

Beyond the boundary of higher-education institutions teaching is faced with changing student populations and can no longer be based upon set curricula. The need arises to make quick changes in course content and to adapt teaching to a constantly new and changing audience. This entails a more individualized kind of training; it involves in the teaching process both scholars, capable of transmitting new knowledge, and people working in industry and in other branches of the national economy, with their acquired experience of the practical application of the achievements of science and technology.

Post-graduate education also calls for a qualitatively different kind of information-provision. It must be able to obtain infor-

mation about fundamental innovations at the moment of their appearance, at the "science-production" interface itself, and bring such information effectively into the teaching process. There must also be substantial differences in its laboratory and experimental basis.

Financial and, in particular, legal aspects of the provision of post-graduate education are especially important in connection with a number of the issues we have been considering. What effect training in the lifelong-education system may have on the careers of graduates, for example, needs careful consideration.

The aspect of further education which must be given the greatest detailed attention, however, is that of the *characteristics of the students* who are involved in the system.

Except for certain forms of education for improving qualifications, further education (of adults) is nearly always on a voluntary basis. In this respect there is already a well-established rule: the higher the educational level a person has achieved, the more he will try to improve it. Education is, in a sense, a positive feedback system: any increase in the input signal (the initial level of education) produces a still greater increase at some subsequent point. Admittedly, this rule, like most rules of social behaviour, is not an invariable one; the probability is there, but may not be realized in each particular case. Difficult family circumstances, poor health, a heavy work-load, or other reasons may prevent a person from continuing his education even when he has achieved a high level of initial training and wishes to further his studies. However, we wish to draw attention to the reverse side of the rule (not always appreciated): the lower the initial level of educational qualifications, the less desire there will be to continue studies. If this fact is not taken into account, such an apparently progressive measure as broadening adult education may in fact lead to a negative social polarization in terms of qualifications. At one pole will be people with a high level of educational qualification: at the other, people with a low level: and this differentiation will continue and increase.

This is by no means a purely hypothetical situation: it is a fact that people with a high level of training do improve it, whereas people with a low level, for whom improvement would seem to be most important, frequently do not. This calls into question the generally widespread opinion that democratization of educa-

tion almost automatically attracts increasingly large student populations into the educational process. Practical social experience demonstrates that it is not enough simply to provide people with equal opportunities for education. It is also necessary to increase their willingness to study (and sometimes, even, to form it), and to arouse in them an active desire to make use of the opportunities provided.

In considering people's attitudes towards education, it is possible to distinguish three types of value-pattern: negative, indifferent and positive. The last can be divided into two subtypes: that which sees education as a means to achieve certain ends important to the individual, and that which sees education as an end in itself.

In the USSR the first of these types—a generally negative attitude towards education—is extremely rare. An indifferent attitude to education is much more widespread, based on the illusory idea that "education is a good thing on the whole, but what I already have is quite enough for me". This type of opinion is typical of people with a comparatively low level of education who consider that they have already reached the "ceiling" of their capacities, that the knowledge they have is enough, and that the situations they encounter at work and in everyday life will not undergo serious changes in the foreseeable future. This mistaken attitude stems from an underestimation both of scientific and technological progress, and of their own personal capacities. Under modern conditions a passive state of mind in respect of learning will have an increasingly negative effect on a worker's qualifications, his budget, his social standing—and, finally, on the economy as a whole.

For this reason it is essential to work purposefully among adults, to create in them a strong disposition to add constantly to their knowledge. To begin with, this disposition can be based on a realization of the need for it: later, it will be encouraged by the ability to derive great personal satisfaction from it.

The need for lifelong education has caused very serious attention to be given to developing the theory and practice of adult-education methods. Many of the aspects of the acquisition of learning by adults, studied as a special field of pedagogics (more recently termed "andragogics"), are taking a larger and larger place in the researches of psychologists and teachers.

The understanding of adults' learning possibilities in a broad range of general, political and scientific fields of knowledge is in itself a big step forward as compared with the view that prevailed at the beginning of the twentieth century. This was decisively expressed by the American psychologist William James: "Adults over twenty-five years of age are incapable of absorbing new ideas. Their dispassionate, disinterested curiosity fades away, their mental associations become set, and their ability to build up their knowledge is spent."[1]

This strongly held view has been disproved by a wealth of practical experience in adult education, gathered as a result of the eradication of illiteracy and semi-illiteracy both in the Soviet Union and in other countries. It has also been disproved by direct experimental investigations by specialized psychologists. For example, it has been found that even such an important quality as the mechanical memory, which seemed clearly to fade with advancing years, in fact remains at quite a high level for a comparatively long time (at least until forty).[2]

Moreover, psychological research has not stopped at simply confirming the learning capability of adults. Many experiments have demonstrated that "in the process of study and mental work favourable conditions are created for the maintenance of the general tone of intellectual development. The mechanisms of psychic functions pass into a state of heightened activeness and mobility. What is happening here is not only a mobilization of the individual's intellectual powers, but also the possible emergence of spiritual interests which may be the source of new stimuli to the development of the intellect."[3]

In modern psychological thinking, adult education is now not only possible but necessary, since whereas the education of children is an important means of developing the intellect, the edu-

1. Quoted by B.G. Anan'ev, *Some problems of adult psychology*, Moscow, Znanie, 1971, p. 9 (available only in Russian).
2. Y.H. Kulyutkin and G.S. Sukhobskaya, *An investigation of the cognitive activity of students at evening classes*, Moscow, Pedagogika, 1977, p. 17 (available only in Russian).
3. E.K. Stepanova, *The rôle of learning in the intellectual development of adults: the methodological bases of adult pedagogics* (lecture summaries), Leningrad, The Scientific Research Institute for General Adult Education of the Academy of Pedagogical Sciences of the USSR, 1972, p. 32 (available only in Russian).

cation of adults is becoming the basis for maintaining and further developing it. As B.G. Anan'ev points out, "the general and social education of adults not only performs a technical and cultural function, but also helps people to achieve a high level of vitality and staying-power. The development of the individual's intellect and of the capacity for learning and constant self-education of the adult is a powerful force against regressionary processes."[1]

The demonstration of the capacity of adults to develop their intellectual potential does not imply, however, that the psychological and pedagogical processes of the acquisition of knowledge are the same in adults as in children. Special research has here revealed significant differentiation. This is connected with the heterogeneity of the pattern of psycho-physiological functions in an adult (the extent, wavering, constancy, selectiveness and concentration of attention, the mechanical and logical-semantic memory, the characteristics of perception, etc.), as well as differences in the way of life of children and adults, reflected in particular in their attitudes to study. Whereas a child is still more often than not regarded as the traditional "object of instruction", the adult—especially the professional—must adopt the attitude of "active subject, taking decisions independently in accordance with his own inner values, motivations and convictions, which are developed in social and working life".[2]

The difference between the theory of child education and that of adult education is thus determined, the main aim of the latter being precisely to foster conditions in which the student can be as active an agent as possible, and to increase the independent nature of the learning process and the control exercised over it by the student himself. Fulfilling these conditions usually means abandoning the traditional class-and-lesson forms of instruction, traditional in normal school teaching practice, in favour of the use of freer methods, with tests only at periodic intervals. In addition, the part played by adult students in the formulation of teaching syllabuses and curricula needs to be increased. In this connection it should be noted that in spite of the comparative clarity of the basic methodological assumptions behind the the-

1. B.G. Anan'ev, *Aspects of the present-day study of man*, Moscow, Nauka, 1977, p. 362 (available only in Russian).
2. Y. H. Kulyutkin and G.S. Sukhobskaya, op. cit., p. 17.

ory of adult education which have been achieved by the efforts of a number of psychologists and teachers in the USSR and elsewhere, the practical recommendations based on these assumptions are so far completely inadequate for the purposes of work in post-graduate-education institutions. Moreover, what has been already achieved is not as yet being consciously applied in practice, since broad circles of the teaching community are not aware of it.

The concept of lifelong education, as we have already pointed out, changes considerably the traditional views of the rôle and place of the teacher in the learning process. In basic education the "master-pupil" or "teacher-student" relationship rests on a significant difference between them in terms of level of knowledge. It is this that usually determines the content of this relationship: the transfer of knowledge from teacher to pupil. This situation depended on the fact that the teacher was as a rule the sole source of knowledge; very few pupils had been taught to work independently with written sources, while sources outside the school, including the mass media, were still insufficiently developed.

Today the situation has changed radically. There is new scope for learning outside the classroom and outside the school (lectures, voluntary groups, olympiads, etc.); there is a great deal more specialized popular-science literature for schoolchildren and students; there have been striking developments in educational radio and, especially, television. The general educational level of parents is higher than before; and habits of independent study are much more widespread. It happens more and more often, nowadays, that the pupil knows more—if only in some narrow field—than his teacher. It is only natural that such situations should arise within the framework of lifelong education: in the very apt words of the Polish scholar Ezhi Volchik, the longer-term result will be that "the teacher will increasingly become the organizer of a learning process in which the learning principle will predominate over the teaching principle".[1]

In adult education (especially at the higher levels) it is better psychologically (and perhaps formally) to replace the words

1. E. Volchik, *The rôle, responsibilities and functions of the teacher in the context of lifelong education: the school and lifelong education*, Warsaw, 1976, p. 251 (available only in Polish).

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"school" and "teacher" by "guide" and "consultant", and the word "pupil" by "participant". As was pointed out at the Third International Conference on Adult Education, "adults need advisers and tutors rather than teachers and lecturers".[1] Such a system of interrelationships, combined with a conscious desire to learn, stimulates the active, creative participation and the independence of the students, which are the guarantee of educational success. And this calls, in the first place, for individual work with the students.

The foregoing are some of the basic considerations that should be in the forefront of our minds in setting up a lifelong-education system. The task of building up such a system, based on the integration of school education and structured adult education, is an urgent one, and is attracting increasing attention from teachers, economists, sociologists and other specialists. In the USSR there is a growing amount of research in various aspects of lifelong education, an increasing number of special studies of such problems are being carried out, and the first collections of articles and monographs are beginning to appear.[2]

In February 1978 the Board of Governors of the All-Union Society *Znanie*, in conjunction with the Scientific Council on Problems of Lifelong Education of the USSR Academy of Pedagogical Sciences, held an All-Union Conference on Problems of Lifelong Education in Modern Conditions of Social Progress and of the Scientific and Technological Revolution. Opening the Conference Academician V.N. Stoletov, who was then President of the Academy of Pedagogical Sciences, stated that the problem of lifelong education was becoming one of the most urgent problems of our time.[3]

The Conference was virtually the first major forum at which the problems of lifelong education had been discussed in the

1. *Adult education in the context of lifelong education*, op. cit., p. 35.
2. I.A. Vinogradov, *Lifelong education — an important condition for the all-round development of the personality*, Moscow, Znanie, 1979; A.P. Vladislavlev, *Lifelong education: problems and prospects*, Moscow, Molodaya Gvardiya, 1978; B.I. Kononenko, *Lifelong education — an important condition for the formation of workers of a new type*, Tashkent, Ukituvchi, 1981; *Aspects of lifelong adult education*, Leningrad, 1979; etc. (available only in Russian).
3. This and subsequent quotations are from *Problems of lifelong education in modern conditions of social progress and of the scientific and technological revolution*, op. cit.

USSR. It was clear, none the less, that the whole issue is an extremely popular one and that a large number of highly qualified specialists in different areas of knowledge—teachers, psychologists, philosophers, sociologists, engineers—are deliberating upon the questions raised at the Conference and have their own (frequently by no means stereotyped) views on the matter. Several interpretations of the concept "lifelong education" itself were presented at the Conference. In the opinion of N.K. Goncharov, Full Member of the USSR Academy of Pedagogical Sciences, "lifelong education should be seen as the principle underlying a system and methods of satisfying the intellectual, socio-political, professional, ethical and aesthetic needs of man, as a principle permeating and unifying the whole system of national education and all the channels of educational influence."

The Deputy Director of the Scientific Research Institute for General Adult Education of the USSR Academy of Pedagogical Sciences, Doctor of Pedagogical Sciences Y.N. Kulyutkin, considered that the notion "lifelong education" can carry a variety of semantic connotations. It may be used in three senses: as a conceptual scheme that predetermines the solution of the many different issues involved in educating people, the lines along which research is to be conducted, the evaluation criteria, and so on; as a specific research subject, i.e., something that can be dismembered and broken down, according to the logic of one discipline or another, with the aims and methods of that discipline; or as an object of management, i.e., a system that is subject to organization, regulation and control. We should take as our starting-point the working-out of the principle of lifelong education itself, this being of methodological importance both in selecting specific research subjects and also in organizational decision-making. The internal principle which unites and cements the various different aspects of lifelong education "is the principle of man's development at all stages in his life in accordance with the requirements of society and his own personal requirements as an individual".

At the same time the well-known specialist in economics, science and education, Professor V.A. Zhamin, saw lifelong education as "the underlying principle of development in a socialist society", and believes that "the further development of lifelong

education will help foster greater social homogeneity in our society and assist in overcoming the substantial differences between mental and physical work"; while S.P. Breev, Master of Pedagogical Sciences, interpreted lifelong education as "one of the forms of social intercourse linked to the satisfaction of a whole range of needs".

Despite their outward lack of similarity, all these and many other definitions supplement rather than contradict one another, and by so doing emphasize the intricate, many-faceted nature of such a complex concept as lifelong education, which in fact lends itself to investigation from the most varied standpoints.

A great many views were put forward on the rôle and place of lifelong education in socialist society. Two sides of this issue were considered: subjective needs and the readiness of the individual for continuous instruction; and public provision for the fulfilment of those needs. As the Deputy Director of the Institute of Philosophy of the USSR Academy of Sciences, Doctor of Philosophical Sciences L.P. Buevoi, expressed it, "the pedagogical task of cultivating a thirst for the acquisition of knowledge is a very urgent one today. If the need for self-education is not cultivated in the individual the idea of lifelong education cannot be realized. To give the right to, and create the corresponding conditions for, self-education is society's job, and it is done with the objectivity peculiar to society. But apart from that, it is necessary to create subjective conditions and ensure that the individual is disposed to realize that right, so that the need for study, the need to enhance his knowledge, is always with him. Without this, the idea of lifelong education will be a purely external necessity and not an inner force." Here, as Professor T.N. Mal'kovsky, Head of the Laboratory of the Scientific Research Institute for General Pedagogy of the USSR Academy of Sciences, pointed out, "the formation of a disposition for lifelong education is a long-drawn-out process. It is preceded by a developed need to obtain and deepen one's knowledge, a feeling of satisfaction from learning, a growing inititative to learn". In return, the knowledge acquired as a result of this, through a discovery of its social significance, will have a decisive influence on such a societal virtue of the individual as social activeness.

As one of the most important conditions for forming a disposition for lifelong education, Academician M.I. Makhmutov

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from the Scientific Research Institute for Vocational and Technical Pedagogy of the USSR Academy of Pedagogical Sciences mentions the introduction everywhere of discovery-learning methods, emphasizing that this approach is important for the theory of lifelong education since "it presupposes the activeness of the subject, his independence in the search for and assimilation of new knowledge, and the conscious use of methods of self-organization, self-education and self-training".

Discovery-learning is also of importance in overcoming a well-known negative paradox: the combination of the overloading of students with knowledge, and their comparative inefficiency in making practical use of the knowledge acquired—in other words, the socio-economic efficiency of education, discussed in the report by a staff member of the Institute of the USSR Academy of Sciences, Bachelor of Economic Sciences V.I. Martsinkevich. Explaining the existence of this paradox by "the lack of a single systems approach to the whole sphere of education, by the disconnectedness of the individual parts, and by an undervaluation of the lifelong factor in instruction", he pointed out that "the more the lifelong-education programme spreads the more obvious is its need for a thorough restructuring. We need to find new rational forms for a permanent and flexible system of lifelong education for adults in line with the changing requirements of social production, the evolution of society, and the individual demands of the workers. In the face of such a massive and organized system the other links in the educational chain will have to change their existing form in a gradual but quite decisive way."

There was wide discussion at the Conference of many other important issues in lifelong education. The final recommendations adopted contain a number of practical proposals aimed at publicizing and explaining the purposes of lifelong education among the scientific and teaching communities and at preparing citizens for lifelong learning activity.[1]

Discussion of the issues raised at the Conference was continued in September 1979 during the All-Union Symposium on Psychological and Pedagogical Aspects of Lifelong Education,

1. "Problems of lifelong education in modern conditions of social progress and of the scientific and technological revolution", *Sovietskaya pedagogika*, 1978, No. 7, pp. 56-81 (available only in Russian).

held in Moscow. This symposium was organized by the USSR Academy of Pedagogical Sciences, the All-Union Society *Znanie* and the Central Council of People's Universities. It explored a wide range of methodological, theoretical and applied aspects of lifelong education, and the definition of its content, aims and duties, and looked at Soviet and foreign experience in this field as well as discussing different models of lifelong-education systems.[1]

In 1981 the USSR Ministry of Higher and Secondary Special Education in conjunction with the USSR Academy of Pedagogical Sciences and the All-Union Society *Znanie*, organized an All-Union Conference on the problems of organizing lifelong education for leading workers and specialists in the national economy.[2] The Conference was divided into sections on the following topics: "Problems of lifelong education in an accelerating process of scientific and technological progress"; "Problems of the development and interaction of State and public education for the improvement of qualifications"; "Pedagogical problems of lifelong education"; and "Psychological problems of lifelong education". A large number of theoretical and applied questions connected with general aspects of lifelong education were discussed, as well as the actual results of teaching adults in various types of education for the improvement of qualifications.

This growing attention to the problems of lifelong education demonstrates the awareness of the present situation on the part of Soviet specialists working in this field.

In the scheme for a lifelong-education system presented in the next chapter there is clearly no need to dwell on the functions of pre-school, general, secondary-special and higher-education institutions as they have developed and exist at present. Attention will rather be focused on the transformations which must now be made, in the author's view, in order to integrate all the elements mentioned into a single lifelong-education system.

1. *Sovietskaya pedagogika*, No. 2, 1980, pp. 24-31 (available only in Russian).
2. *Problems of organizing lifelong education for leading workers and specialists in the national economy* (themes from statements), Moscow, 1981 (available only in Russian).

III. An outline scheme for educational renewal

The author is putting forward this outline scheme for the lifelong-education system at a significant moment in the development of education in the USSR. After nation-wide debate the Soviet Parliament has now adopted the "Basic Guidelines for the Reform of General and Vocational Education" prepared by the Central Committee of the Communist Party of the Soviet Union. This programme, which lays down scientifically-based long-term prospects for the improvement of national education in a country at the stage of a developed socialist society, can be seen in one sense as the corner-stone for the whole of lifelong education. For "the reform..." now being undertaken "... will create conditions for the combined development of the national education system". And it is only by linking together all the subsystems of education in a process of combined development that the planned system, and lifelong education in general, can be made a reality.

The principle of linking together is set out in the text decreeing the Reform as being the initial principle even for school education. The Reform assumes that "the path towards school education is laid by the development of pre-school education" and that "the teaching of six-year-olds is to follow a single curriculum both in schools and in the older groups in kindergarten." As laid down in the "Basic Guidelines", primary schools are called upon to facilitate the subsequent acquisition of the bases of science, which schoolchildren have to master at the next stage of instruction (in grades V to IX), and it is here, too, that adolescents are given vocational guidance, a general preparation for

work, and other assistance to make it easier for them to choose their future jobs. The nine-year school is the basis for the acquisition of general-secondary and vocational education through various channels selected by the pupils themselves according to their awareness of their own capabilities and to the needs of society. Finally, the secondary general-education school (grades X and XI) provides pupils with all-round secondary education as well as labour and vocational training.

Since the conditions at each stage of school education are clearly defined, and since each preceding stage is given a clear purpose focused upon the tasks of the subsequent stage, the functions of the educational subsystems are closely linked together. This linking is the foundation for the "relay-type technology" that underlies the education system's lifelong influence. The task now is to integrate the basic-education system, functioning as just described, with the education that must take over where school education (at any level) leaves off, and that will become a person's companion for the rest of his life.

It is this out-of-school part of the lifelong-education system that is the subject of this outline scheme. For want of a more exact term in pedagogy or andragogy to describe this part of the system we shall call it supplementary education, which, by integrating with basic education, must merge into a single lifelong-education system. The most suitable approach to the design of supplementary education is through an overall analysis of the structure and tasks of basic education.

One last preliminary comment needs to be made. For as far ahead as we can see, the lifelong-education system which is taking shape will probably consist of three interrelated subsystems: general education, special education (together giving basic education) and supplementary education. To begin with, the boundaries between the subsystems will be clearly marked, by certificates, diplomas, and so on. This will obviously be a temporary situation: later, as a result of integration, the frontiers between basic and supplementary education will gradually disappear and the need for diplomas, not to mention their value for life, will fade away.

A. Basic education: a subsystem of general education

1. Pre-school education

In this subsystem infant pre-school institutions in close co-operation with families see to the all-round harmonious development and upbringing of children, look after their health and physical fitness, inculcate in them elementary practical skills and a love of work, and show a concern for the forming of their aesthetic sense; they prepare children to go on to school itself, and instil in them a sense of respect for their elders and a love for their country and their birthplace.

The most important function of pre-school institutions, as far as the aims of lifelong education are concerned, is that of preparing children for future learning and imbuing them with an industrious attitude.

The pre-schooling element in the general-education subsystem should obviously be characterized by flexibility and by variety in forms of teaching. It should aim at ensuring that children have an equal starting-level of knowledge and abilities when they move on to the first class in the next stage of the general-education system, primary schooling.

2. Primary and secondary education

Whereas in pre-schooling the emphasis is on flexibility in forms of teaching and singleness of content, in the next stage the reverse is needed: there must be a unification of forms of teaching (e.g., the single-labour polytechnical secondary school) with a maximum of variety in and striving towards individualization of learning, as well as every kind of combination between learning and socially useful and socially significant productive work.

The first stage in the general-education subsystem is primary school. Primary schools are called upon to take up where pre-schooling has left off, so that even at this stage the linking laid down in the Reform is achieved. Schooling here should be based on short lessons and extensive use of various play-situations; it should focus not so much on handing over a huge mass of knowledge wholesale to all pupils, as on sustaining their interest in learning and fostering their ability to work independently—on developing their power to think for themselves by every possible

means ("learning to learn"!). At the same time, careful analysis of the learning preferences of each pupil should help the teacher to assess his personal preferences and particular interests, so as to guide him in his later studies and in his choice of vocational options.

Finally, primary schooling should transform the child's pattern of sensations into a more conscious perception of the surrounding world, which in turn will motivate him to acquire more knowledge and later to use his knowledge and skills in the course of his work and his everyday life.

At the secondary stage, differentiation of teaching occurs as a response to the understanding of the pupil's own interests. This differentiation entails voluntary group work, and the selection of one or two non-compulsory options, in the beginning. These increase in number as time goes on, until eventually the pupil is given a set of "closed options" (he has to choose a fixed number of options from a given compulsory range) and "open options" (he may choose what interests him most). Finally, in the senior classes, various "leanings" start to form in the direction of physics and mathematics, chemistry and biology, technical subjects or arts subjects. Whereas at the outset a change of interest may be seen as normal and even welcome, as he grows older this "switching" must, in the pupil's own interest and in that of the future job, be narrowed down and come to focus more and more on the job that corresponds to his capabilities and expectations, seen in relation to social demand.

An increasing place is being given in secondary schooling to discovery-learning methods, which stimulate and develop independent study. This is gradually developing into a system of lectures, seminars and practical work, an excellent introduction to the methods of further adult education.

Subject-oriented teaching of this kind, in the later stage of secondary schooling, must go hand-in-hand with compulsory polytechnical training and productive work. In the words of Karl Marx, "from nine years of age onwards every child must submit to the general law of nature, which is that to eat a man must work, and work not only with his head, but with his hands too".[1]

1. K. Marx and F. Engels, *Works*, Vol. 16, p. 197.

The same thought was expressed more than once by Lenin, who included among the tasks of schooling for the immediate future "...(3) the provision of free and compulsory general and polytechnical education (i.e., giving a knowledge of theory and practice in all the main branches of production) for all children of either sex up to the age of sixteen; (4) establishment of a close link between teaching and socially productive child labour".[1] The immense experience accumulated by Soviet teachers in the education of young people for work[2] enables us to single out here three interconnected component parts:

1. Polytechnical instruction, which, in the words of Lenin, "does not mean that everything must be taught, but only the basis of modern industry in general..."[3] This instruction must be given through lectures coupled with visits to industrial firms in the various branches of the national economy, extensive use of educational films and television programmes, and the participation of a wide range of active workers employed in different areas of production and capable of talking interestingly about their work.
2. Instruction and practical experience in the performance of services at three different levels:
   - personal services (sewing, cooking, laundry, etc.);
   - services within the collective (cleaning premises, routine maintenance, ability to handle and to carry out simple repairs to domestic equipment, etc.);
   - services within a micro-region (street cleaning, mail deliveries, deliveries of goods, checking and carrying out simple repairs to telephone kiosks and automatic vending machines, and other similar everyday services).
3. The acquisition (side by side with studies) of one or perhaps more trades (at present covered by vocational and technical education), with actual productive work for two to four hours each school day, either at the school industrial-agrarian com-

1. V.I. Lenin, *Complete collected works*, Vol. 38, p. 116.
2. See, for example, A.S. Makarenko, *Works*, Vol. 5, pp. 187-224; I. Sinitsyn, "Learning and work", *Nash sovremennik*, Nos. 1-2, 1982; A.I. Novikov, "On the productive work of adolescents", *Sotsiologicheskie issledovaniya*, No. 3, 1981; etc. (available only in Russian).
3. V.I. Lenin, *On upbringing and education*, Moscow, Prosveshchenie, 1970, p. 521 (available only in Russian).

plex,[1] or at an interschool production unit. As examples of the latter we can take the "Chaika" works in Moscow, the school factory in Zhigulevsk, and others; or individual shops at large plants, such as those already in operation at the Kharkov tractor works, the Chelyabinsk tractor works, the Leningrad optical mechanical unit, and others.[2]

Interschool training-production combines and well-equipped school workshops, once they have been suitably developed and converted into genuine economic units, can serve as a more or less acceptable basis for school and interschool labour enterprises. Experience has shown that the efficiency and quality of work done by schoolchildren are frequently as high as (and sometimes better than) those of work done by adults. As a result, the revenue from the productive work of school pupils (even on a low estimate—some thirty million schoolchildren, working two hours a day at only one-fifth of the level of productivity of the average industrial worker) will amount to some twenty-five billion roubles; in other words, will provide for the budgetary expenditure on general-education schooling of all kinds three times over.[3]

There is no doubt about the economic efficiency of these measures, or their assistance in compensating for the labour-resource shortages resulting from the current demographic situation, but their chief importance from the educational standpoint lies elsewhere.

There is a qualitative change in the development of pupils. They are formed as active people, anxious to work and untainted by parasitism. Furthermore, they are endowed with what might perhaps be called labour sovereignty: in other words, they are

1. Examples of such complexes are described, for instance, in the reports by E.G. Kastyashkin, "A variant of the pedagogical conception of the school of the future (1990-2000)" and by V.S. Aransky and V.V. Kunarina, "The school complex (one version of the school of the future)" in the collection *Forecasting the development of schools and pedagogical science*, Moscow, Academy of Pedagogical Sciences, 1974, Part I (available only in Russian).
2. See, in this respect, S.N. Alekseev and N.P. Semykin, *The wise school of labour*, Moscow, Molodaya Gvardiya, 1983 (available only in Russian).
3. Calculated from *The USSR national economy in 1980: a statistical yearbook*, Moscow, Financy i Statistika, 1981, pp. 123, 134, 525 (available only in Russian).

capable of serving and providing for themselves and, even more, they are consciously inclined to support those around them through their work. By participation in work, pupils are made aware of the moral claims of community life.

Equally important is the specific influence of work as an organic part of instruction on the learning initiative of the pupil and on his relationship with the teacher. Work calls for skilful application of knowledge received. Success in doing this enables the pupil to assert himself among his peers. This in itself strikes at the very root of formalized learning, dogmatism and mechanical cramming: a pupil needs to find out in order to succeed. Knowledge is evaluated by the results of work, in exact ratio to the degree to which it has been assimilated. The pupil recognizes for himself what his own value is, while the teacher, with the results of the pupil's work there for all to see, can assess the pupil's knowledge objectively in front of the whole class.

As a result, all pupils on leaving secondary school will have behind them first, a basic education which equips them to enter the special-education subsystem and, second, a vocational training. This latter provides a grounding for those who either cannot or do not wish to go on to special education, allowing them to start work at once in some branch of the economy, chosen by them on the basis of vocational preference tested in practice.

From the standpoint of the aims and purposes of lifelong education, the value of this kind of general education is that the pupil comes out of it filled with the incentive to learn. He has been convinced by his own experience that without knowledge work cannot produce results, and that without results he will not be able to assert himself in society. He is ready now to set out along the path of learning which does not, and cannot, have an end.

3. The special-education subsystem

In a world where knowledge is constantly growing, it is not really appropriate to speak of "higher" education.[1] The concept of

1. N.K. Krupskaya had already pointed out that it was incorrect to talk of "complete higher education", since a person goes on developing throughout life.

lifelong education compels us to give up the idea of "higher" education. On the one hand, man must develop constantly, never stopping at the level he has reached; on the other, science advances as each day passes, and man can grasp its principles only gradually. He must always press on towards the limits of learning: he can never finally reach them.

In defining the place of special education (i.e., the whole range of present-day special and higher education) in the lifelong-education system as a whole, we must start by realizing that even today, broad specialist training and narrow specialization cannot be made to fit within the limits of a five- or six-year curriculum. The rapid extension of the range of knowledge needed by modern specialists has meant that even if we make instruction as efficient as we can (by using active methods, audio-visual techniques, training aids, sophisticated technical resources that stimulate and exploit the cognitive interest of students) we still cannot, in a fixed time-span, teach a student all the facts of theory and method that apply even within the confines of a comparatively narrow specialization.

In fact, however, there is no need to do this. At each individual place of work the solution of actual problems requires a much narrower range of knowledge than the speciality as a whole requires. The full range of knowledge is never needed at once: what is needed is the ability to find it quickly and use it well. And for this, as we have seen, what is needed first and foremost is a good fundamental training—and it is precisely this that basic special education is supposed to provide. In the words of V.P. Elyutin, USSR Minister for Higher and Secondary Special Education, "The foremost responsibility of higher-educational institutions is to provide training for specialists of a new type, not only possessing a wide and thorough education, but also given to creative thinking and capable of taking an active part in scientific and technological progress, as well as acting as genuine vehicles for and bearers of that progress. In other words, the fundamentality of education, the level of development of creative potentialities in specialists, the extent of students' mastery of techniques for acquiring knowledge independently and of their ability to use it in constantly changing conditions, these are becoming the basic criteria by which we have to judge the quality of training and education, and are increasingly to be seen as

the indicators we must start from in laying down the strategy for the development of higher education."[1]

Consequently, the main task of basic special education is to establish a firm general theoretical bedrock and, on this foundation, to create a persistent demand for lifelong education, as well as all-round skills in self-education. And the importance of coping with this responsibility will undoubtedly increase in the future.

But if we confine ourselves only to fundamental disciplines, in the full sense of the term, the young specialist when he comes out of an educational institution will be quite unfit for real work. It will demand supreme efforts, "and a corresponding amount of time", for him to "gear" theoretical propositions to the solution of practical problems. The only way to avoid this situation is to combine broad general training with narrow specialization. The purpose of the latter is precisely to prepare students for practical work. However, whereas the range of fundamental disciplines is quite clearly delineated, and their teaching is comparatively stable, the content of a special subject is distinguished by extreme changeability and an unevenly charted number of hours needed for studying it. More often than not, the teachers of each subject think that their's is the most important one for the training of students, and want it to be presented as completely as possible. And since the future specialist's needs cannot usually be foreseen, the attempt is made during his special training to get him to bite off more than he can chew, to arm him with every conceivable kind of knowledge that he might need in the future. Since it is manifestly impossible to cram everything into a limited number of hours, a paradoxical situation results: surveys among young specialists about the way they use their knowledge in the course of their work show that on the one hand they simply do not use a substantial part of what they know, while on the other, they lack a lot of the information that they do in fact need in order to do their job.

This wasteful anomaly is overcome by integrating special education with work. In this way the student, one, two, or even more years before he "officially" goes out to work, already knows which firm and which place of work he will be going to.

1. V.P. Elyutin, *Higher education in a society of developed socialism*, Moscow, Vysshaya Shkola, 1980, p. 215 (available only in Russian).

Moreover, he will already have been to that firm more than once, not just as an onlooker, but as a worker "in the same shop" or as a laboratory assistant "in the same laboratory". It is here that he acquires practice in production, that he undergoes his probation training, and that he chooses the topics for his course work and diploma project.

The young specialist is thus given the practical possibility of forming a clear idea of the specific tasks he will be called upon to undertake at the start of his working life. This allows him to put together his own individual syllabus for precise vocational specialization, in consultation with members of the firm and of the teaching departments concerned. Take the case of a mechanical engineer who is going to work as a foreman or shop superintendent in one of the shops at a machine-building plant. His individual training syllabus will include detailed knowledge of the machine-tools actually used in that particular shop, tools which he will have to use in the near future, plus those aspects of production economics, sociology and psychology which are also needed in his job. If he goes on from there to another shop the list of machine-tools to be studied will change, and if he moves to a design office he will need a quite different set of knowledge, focused on certain specific types of equipment for use in the future.

However—and herein lies the whole meaning of lifelong education—dynamic super-specialization of this nature is possible only if there is a guaranteed opportunity of constantly acquiring additional knowledge as the need arises, as a result of change of equipment, new production responsibilities, a change to different work, or any other factor that alters the production situation. This opportunity must be guaranteed in two different ways. First, the specialist must be capable of grasping and mastering new knowledge, and in this he will be helped by his prior broad fundamental training and the general development of his thinking capacities; second, he must be given the chance to obtain the required information, and this is the job of the institutions in the supplementary-education subsystem that we shall be dealing with later.

This idea can be carried even further. Within the lifelong-education system, where the fixed boundaries between working time and learning time no longer exist—in other words, where

work and education are united—there is no longer any need to cram all the necessary general knowledge into the pre-working period of life.[1] The teaching of part of the knowledge usually acquired in higher- and secondary-special-education institutions can be carried over into the "post-graduate" stage of education (to use present-day terminology). However, this is possible only within a well-developed, highly efficient system of supplementary post-graduate education, operating continuously on the cognitive vitality of man.

(a) *The first cycle of special education.* The special-education subsystem, though varied in content to ensure individualized instruction, is single in form. It comprises special teaching institutions of one type, and consists of basic consecutive cycles lasting from one to three years. After them come additional instructional courses, intended to maintain or raise the level of qualifications. Work in a particular job goes on either between cycles, or in parallel with training in any one of the cycles, or both, as dictated by the requirements of the particular speciality and the functional nature of the training being given.[2]

Students enter the first cycle of special education either immediately following secondary education or after working for some time in the social production system. The instruction given (usually lasting two years) is aimed mainly at imparting to students the fundamental grounding they need to work in their chosen field, and at developing further the self-educational skills acquired at secondary school. The first-cycle curriculum is approximately the same for all students, regardless of their future qualifications, and differentiation occurs only after completion of the first cycle. Instruction in the first cycle, owing to its broad theoretical character, may well be unconnected with any partic-

1. As already noted, the ideas "pre-working", "pre-productive", practically disappear; productive work, in one form or another, takes place from nine or ten years of age onwards, and only the ratio between learning time and working time changes at each stage of life.
2. In the intervals between cycles every possible encouragement is given to students to take part in activities of various kinds in order to raise their ideological, political and general cultural level, even though not directly connected with their jobs (through people's universities, political and economic studies, self-education, and so on).

ular field of productive work, though such work must nevertheless be encouraged.[1]

After completing two years' instruction in the first cycle of studies, students are selected (in accordance with their wishes) for various forms (cycles) of further study. The two years of joint instruction with a common curriculum will have enabled teachers to determine the real inclinations and capabilities of the students, much more reliably than by examinations. At this stage students are divided into two groups: those who will go on to a shortened course of instruction (one to two years of narrowly specialized training, leading to a first-stage diploma), and those who are destined for the full second-cycle training course (three to four years of studies, leading to a second-stage diploma).

(b) *The second cycle of special education.* On successful completion of the first cycle, therefore, students move on into the second cycle, where they are divided into two streams: a shortened (A) stream and a complete (B) stream. The A stream trains middle-level workers, such as technicians (specialists with secondary-special education). They may, for instance, become laboratory assistants in scientific research institutes, junior maintenance engineers, junior designers, etc. The difference is that those coming from the A stream will have a better general theoretical training, and a less good specialized training, than today's graduates from secondary-special educational institutions. This will be achieved, on the one hand, through the course in fundamental disciplines common to all students (the first cycle) and, on the other, by training for a specific place of work and additional on-the-job training. In the opinion of some experts, A stream students should sit for their diplomas only after working for one or two years in production.

The other distinguishing feature of the cyclical system is the possibility for a student completing the A stream to continue training, starting at once in the B stream, i.e., in the second cycle. In the conditions prevailing at present graduates from a technical

1. According to sociological research findings, even today "the proportion of students wishing to combine study with work on a part-time basis represents more than one-third of the total student population". See Y.E. Volkov and V.Z. Rogovin, *Questions of Soviet social policy*, Moscow, Politizdat, 1981, p. 138 (available only in Russian).

school who continue their studies in a higher educational institution start from the first course in the overwhelming majority of cases. To a considerable extent, of course, this duplicates their previous training—and incidentally, therefore, applies a psychological "brake" on the continuation of their studies.

Stream B consists of three to four years of training, and prepares highly qualified specialists capable of setting and solving modern production problems independently. The principle characteristics of their studies are: a reduction in the number of disciplines by means of amalgamation; avoidance of duplication; a shift to independent study, with subject teachers available to provide advice and information; the most extensive use possible of technical teaching aids which bring instruction closer to the real work-situation (training aids, games, problem-situation modelling using computers, etc.); and, in particular, the placing of basic courses directly linked with production in a practical setting (productive work in industrial plants, practical work, probational training, realistic course work and diplomas, etc.). The close link with future working life must be maintained throughout the whole training programme of each student.

The ideal approach, of course, would be to combine second-cycle studies with work in industry, but for a number of organizational and geographical reasons this is not always possible. A more realistic way is to make a preliminary allocation of students to firms at the start of the second cycle.

The most acceptable way of doing this appears to be by means of a legally constituted agreement between the special-education institution and the firm concerned, setting out the rights and duties of the three interested parties, namely, the educational institution, the firm and the student. Such agreements are already in use by some educational institutions, and have proved effective.

For instance, the placement agreement used at the I.M. Gubkin Institute for the Petrochemical and Gas Industries in Moscow states that the firm undertakes to organize all the student's practical work, to supply the topics for course and diploma work, and to provide the opportunities for it to be done. Furthermore, if the student successfully completes the individual training syllabus agreed on with the firm, the latter agrees to place him after graduation in a job agreed upon in advance and at a rate of pay

falling within the current wage-bracket for that job. The educational institution on its side undertakes to provide all the conditions necessary for the student to work on the agreed training syllabus, and to include in the syllabus such subjects and specialized courses as the firm thinks will be of greatest value to its student and future specialist.

As for the student, the inclusion in the agreement of a paragraph about his studies and their quality, not to mention the very fact that the agreement is signed with him personally, noticeably increases the interest he takes in his studies and heightens his sense of responsibility for the quality of his education. The feeling of being needed, of being attached to a certain firm and a certain workplace, really transforms the student from a passive object into the subject of education. It motivates him to learn, to perform, to create; it makes him take the whole business of studying more seriously, since it now has a purposeful direction and a tangible result.

Other terms and conditions for agreements between firms and educational institutions are, of course, possible (special-purpose student grants, joint scientific research, payment for organizing the required special courses, etc.). A further strengthening of the links between the educational system and the social production set-up seems, in any case, both indispensable and inevitable. The creation of education-science-production centres is one possibility; some such centres already exist.

Realization of the aims of this cycle is greatly assisted by the widespread use of active discovery-learning methods. These include techniques of programmed learning, insufficiently employed as yet, especially in their most successful forms as proposed by certain Soviet specialists. Professor L.B. Naumov of the Novosibirsk State Medical Institute has suggested and developed the "teaching algorithm" method,[1] which, in spite of its naturally controversial nature, is gaining more and more recognition among specialists. In the words of Academician I.F. Obnaztsov, Minister of Higher and Secondary Special Education of the RSFSR, "algorithmically-based instruction is in general a highly progressive method, which permits a substantial improve-

1. See *The economics and organization of industrial production*, No. 5, 1979, p. 92-122 (available only in Russian).

ment in qualitative results together with a considerable saving in pupils' and teachers' time".[1]

(c) *The third cycle of special education.* On completion of the full course of the second cycle and after sitting for the diploma, the majority of graduates commence work by taking up jobs at the workplaces they have been specially trained for; the others move on into the third cycle of special education. Usually these latter are future scientific workers, teachers in the special-education subsystem and, possibly, workers in the higher echelons of management who, by the time they take their second-cycle diplomas, have already built up a sound experience of production and shown distinct organizing abilities.

In this cycle, even more than in the first two cycles, such characteristics as individualized training, insistence on maximum initiative and independence, and close resemblance to the conditions that the student will encounter after completing the cycle, are insisted on. Thus, future scientific workers carry out real and to a large extent independent research; future teachers organize and conduct seminars, supervise the laboratory and independent course work of students in the first and second cycles, and give them special courses; and future managers take an active part in the design and introduction of management systems, as far as possible finding for themselves solutions to the problems that arise.

The final aim of the third cycle of special education is to train people, by the age of 25-27, to be highly qualified research workers and teachers, able to work with a high level of performance in scientific research and educational establishments, and also in the various branches of management.

There is one further essential element in the special-education subsystem, which ought probably to be separated from the second and third cycles, and might provisionally be called the fourth cycle of special education. This element is the periodic improvement of the qualifications of specialists after they have obtained diplomas attesting to their having attained a certain degree of specialized training. This should not be confused with work to improve qualifications in the fullest sense—a problem

1. *The economics and organization of industrial production*, No. 5, 1981, p. 106 (available only in Russian).

that forms part of the supplementary-education system and will be dealt with later. What we have in mind here is the so-called refresher training for specialists, to enable them to keep their knowledge up to the requisite professional level.

Some of the knowledge acquired inside the walls of an educational institution is forgotten; some of it becomes obsolete and has to be replaced by fresh information. In the learning process this is continually happening. In spite of the frequently heard complaints regarding the inertia of the educational system, curricula and course-content in almost all special-subject fields are changing continually, even if sometimes too slowly. As a result, the body of knowledge acquired by graduates in the same special field, but finishing their training at widely spaced points in time, may differ quite considerably.

The purpose of the part of the educational system we are now considering is, precisely, to bridge this gap and to work in concert with former graduates to restore the knowledge they acquired earlier and have since forgotten. This responsibility, we feel, should be assumed by basic-education institutions, for they are best placed to know what changes have occurred in the content of the subjects they are teaching. This kind of refresher training can in theory be provided elsewhere than in basic-education institutions (just as these institutions can extend their own functions and deal with the broader range of problems involved in the improvement of qualifications). Even so, it is the basic-education institutions that should supervise the process of refresher training, decide on its frequency and determine its content.

B. Supplementary education

The term "supplementary education" is not yet in widespread use, and its precise meaning is not clear even to specialists. Before describing the elements in this subsystem, we will recall its main aims and the difference between it and the basic-education subsystem.

In discussing supplementary education after general and special education we do not wish to imply that a pupil can enter the supplementary-education subsystem only *after* completing basic education. In fact, as was shown at the beginning of the previous

chapter, supplementary education can also extend to children in kindergarten and to pupils and students in secondary and special education, by helping them to acquire knowledge that falls outside the curricula of their respective stages of basic education.

Supplementary education, moreover, should not be confused with "adult education", although the two have much in common. But there is one very great difference: in addition to the "children's supplementary education" just mentioned there is what may be called "basic adult education", i.e., evening and correspondence courses given by schools, colleges, secondary-special and higher-educational institutions.

The term that perhaps comes closest to the supplementary-education category is "extra-mural education", although in traditional usage this expression is applied mainly to the acquisition of school knowledge by adults outside the framework of formal schooling. The need for such a process arose in the past primarily from the inadequate coverage of basic-educational establishments, the fact that they could not provide for all children and young people of school age; that kind of demand has fallen off sharply, and will doubtless disappear completely in the near future. Nevertheless, the term "extra-mural education" itself, if "extra-mural" is taken in its broad sense as meaning outside all basic-education institutions, is an entirely acceptable equivalent for supplementary education. In that case, it is to be understood as the purposeful acquisition of socio-political, natural scientific and technological, and also general cultural, knowledge, outside basic-education institutions.

In theory, the content of supplementary education, like that of basic education, may embrace the entire sum of knowledge, abilities and skills accumulated by mankind. In reality, however, a certain dichotomy in their interrelationship is already apparent, and will be emphasized as time goes on. The basic principles of the sciences will be taught in the basic-education subsystem and seldom included in supplementary education, while the latest achievements of science and technology will be taught mainly in supplementary education, since it inevitably takes time for these achievements to become part of the curriculum in traditional educational establishments.

From the standpoint of the individual's learning requirements, too, there is a difference between the two systems. In the basic-

education subsystem, the learning "trajectory" will be made up principally of "verticals" of purposeful progression from the basic scientific principles needed for professional purposes towards the latest discoveries and achievements. The learning "trajectory" in the supplementary-education subsystem, however, will include many "horizontals", reflecting the many-sided interests of the individual and his need to find his bearings among the most varied phenomena without making a fully job-oriented study of them. In addition, in the basic-education subsystem there will be a large number of "standard blocks", i.e., uniform sets of knowledge possessed by large numbers of pupils (the secondary-school curriculum, socio-political disciplines in natural-science and technical colleges, general-engineering disciplines in higher-educational institutions, etc.). Such standard blocks will be much less frequent in supplementary education, and the teaching syllabuses will be much more individually tailored.

An important feature of supplementary education is its focus on satisfying the learning requirements of the students, in line with their job needs or other individual interests. The students in institutions in this subsystem are in the main highly motivated; admittedly, this makes the work of both teachers and pupils easier, but at the same time it lays stress on such subjective factors as an individual's pattern of inclinations and needs in the educational sphere and—most important of all—the importance of providing syllabuses to meet those needs. In other words, whereas it is society that has the last word in deciding on the content and forms of basic education, in supplementary education it is the possibility of satisfying the personal demands of each individual, as such demands have resulted from scientific and technological progress in industry and social progress in society, that provides the main stimulus.

The variety of individual learning requirements is so wide-ranging that their satisfaction is possible only if the working methods of supplementary-education institutions are highly flexible. Teaching methods cannot be uniform, since the most varied types of teaching can be combined: formal courses and correspondence courses, day and evening classes, lecture courses and lecturing bureaux, the mass media and propaganda, individual tutorials, and so on. Everything depends on the aims that the

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student sets himself. In consequence, it is simpler to structure the supplementary-education subsystem from the standpoint of its aims and purposes rather than from that of the forms of institution through which it is provided.

To sum up, it may be said that the aim of supplementary education is to increase (or, where necessary, to form) in an individual the ability and the desire constantly to acquire new knowledge. Supplementary education is, in its own way, a kind of mental gymnastics, keeping the mind in a state of constant readiness to absorb all that is new and progressive while rejecting all that is superfluous and out of date. It can almost be said, in one sense, that it is not what a person learns that is important so much as the fact that he goes on learning throughout his life. At the same time, it is clear that for any particular individual, study is not an end in itself; it is merely a means to enable him to measure up to the ever-changing and increasingly complicated demands made upon him by life.

These demands arise in all the basic spheres of life: professional work, public life, personal relationships, leisure. And the supplementary-education subsystem responds to them in various ways, by providing for changes in job qualifications, helping people to find worth-while social work or interpersonal relationships, fostering their general cultural development, and teaching them how to use their leisure time. So wide a field of action has given rise to a broad spectrum of different types and forms of supplementary education—among them, as we have mentioned, the institutes and faculties for the improvement of qualifications, the system of economic and political studies, all kinds of formal and correspondence courses, lecture courses and lecturing bureaux, teaching through the mass media, purposeful self-education, and the people's universities.

The strength of supplementary education lies in its great variety: in theory, any learning requirements can be satisfied. But it is here too that its weakness lies: in the haphazardness of the system, which reduces the efficiency of its teaching.

In the lifelong-education system of the future the existing flexibility must be preserved, but must at the same time be made more systematic and co-ordinated. This will be possible only through smooth social organization and co-ordination of the whole undertaking, preferably under a specialized State manage-

ment body. Such a body should be given the possibility of exerting an influence across the entire lifelong-education system, from pre-school through post-graduate and on to supplementary education, thus becoming the instrument for linking together the functions of all its subsystems.

The supplementary-education subsystem itself clearly needs a strong central element, to act as a kingpin holding all the other elements together. This key element should make the individual feel that he has a place in the subsystem, and should guarantee him that place; it should decide what are the most effective ways for him to gain knowledge and skills; and it should constantly supervise and check his level of educational attainment.

In our opinion the most suitable basis for this central element in the subsystem might well be the people's universities, appropriately remodelled, and broadened in scale and, particularly, in functions. As Academician G.I. Marchuk has said, "practice shows that the people's universities are one of the most effective forms of lifelong education for Soviet men and women. We are striving to achieve the all-round development of each individual person and, in this matter today, it is difficult to overestimate the part played by the people's-universities system".[1]

The network of people's universities has more than tripled in size in twelve years, and the number of people attending them has increased fourfold. A substantial number of these universities have many years' experience behind them: 6 per cent have been in existence for over twenty years, 22 per cent for over ten years, and 49 per cent for over five years—i.e., 77 per cent of them have been running for over five years. There has been a sharp fall in the drop-out rate per academic year: in 1983/84 the figure was only 3.5 per cent, proof that the people's universities take real account of the interests of those who attend them and of the requirements of labour collectives.

16.2 million students,[2] in some 52,200 people's universities, are gaining knowledge in a very broad range of arts, natural science, engineering and other subjects. The number of branches of knowledge studied is constantly rising, and today includes almost all the scientific disciplines. A trend is also noticeable in

1. *Nauka i zhizn*, No. 10, 1982, p. 15 (available only in Russian).
2. According to the Central Council of National Universities.

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the development of these universities towards a more differentiated approach to the organization of the learning process, towards an increase in the number of faculties and branches, and towards an optimization of their structure. They have broadened their range considerably, and are developing in the following areas:

1. Cultivation and satisfaction of the ever-growing needs and interests of Soviet men and women in the most varied branches of knowledge.
2. Improvement of the vocational level and job qualifications of workers. There are almost 4,000 universities and over 11,000 faculties doing this work in various branches of the national economy. In the last six years alone they have improved the qualifications of more than four million factory workers, engineering and technical staff, and office employees, leading to an increase in productivity valued at hundreds of millions of roubles.
3. Assistance to workers in learning to do social work in various fields, so as to make them more active in public life and more competent to take part in the affairs of the State. Among those studying in these universities can be found members of local Soviets, people's assessors, youth leaders, voluntary fire-fighters, and active members of people's voluntary law-and-order, health, environmental protection and cultural bodies.

Over 3.6 million people study in more than 9,000 people's universities of this group. The list of responsibilities undertaken by these universities and the growing volume of work they perform clearly demonstrates that the rôle they play in accelerating scientific and technological, as well as social, progress is constantly increasing. The requirement laid down in the decree of the Central Committee of the CPSU for a more balanced development of the urban and rural networks is being successfully fulfilled. Over a twelve-year period the number of people's universities in urban areas has doubled, while that in rural areas has risen fourfold.

There are favourable trends also in the pattern of attendance at these universities. In the past the number of factory workers, collective-farm workers, and (in particular) young people was not very high, but over the last twelve years the number of factory

workers has increased sixfold, and the number of collective-farm workers and young people has increased four-and-a-half times, within a fourfold increase of the overall student population. At the present time industrial and collective-farm workers represent 56 per cent of all students, and young people under 29 years of age represent 45 per cent.

Changes are also noticeable in the educational level of the students. Among all those attending people's universities in 1980, 23 per cent had higher or incomplete higher education, 20 per cent secondary-special, 32 per cent general-secondary, and 25 per cent incomplete secondary education. Clearly, these universities have won acceptance among a broad cross-section of the population, and have become an integral part of the spiritual life of a developed socialist society.

In addition to lectures, in 39,000 people's universities (75 per cent) seminars and practical activities are organized, as well as other active forms of instruction; in 21,000 of them (40 per cent) students do course and diploma work. Active forms of instruction represented 68 per cent of the total instruction given in 1984. The improvement in the teaching-learning process has been accompanied by an increase in the average duration of studies: in the 1983/84 academic year 40 per cent of students were following a two-year curriculum and 25 per cent were studying on curricula spread over three or more years.

In recent years there has been a substantial increase in the numbers of teaching staff in the people's universities, and an improvement in their qualifications. There are more than 900,000 scientists, staff members of higher-education institutions, Party, Soviet and economic leaders, experts on the national economy, and cultural figures teaching in these institutions, and in many of them there is now a permanent teaching staff; 400,000 of the teachers (44 per cent) have been working in people's universities for more than two years.

There has also been a marked rise in the level of those at the head of people's universities—rectors, pro-rectors and deans. Most of these institutions are now headed by highly qualified specialists with great experience in organizing the learning process in adult education. The number of those involved in the direction and management of the universities has increased considerably: 295,000 men and women, including 114,000 students,

are at present members of the social councils of the people's universities.

Support for the people's universities comes from a wide variety of sources. About 20,000 of the institutions are based on industrial and agricultural firms and enterprises. Furthermore, an increasingly large number of ministries, government departments and public organizations are taking part in the development and improvement of the work of these universities: 27 per cent of them work in the USSR Ministry of Education system, 13 per cent in the system run by the All-Union Society *Znanie* and the industry ministries, branch unions and the building and transport workers' unions, 10 per cent with the Ministry of Culture, and 6-7 per cent with the USSR Ministries of Agriculture and Health. The highest growth rates both of universities and of student numbers are to be found in the industry-ministry system.

An effective structure has been formed for the management of people's universities throughout the country, on territorial and administrative lines. The councils of people's universities in the Union Republics are as a rule headed by the Deputy Chairmen of the Councils of Ministers or the Deputy Chairmen of the Praesidiums of the Supreme Soviets of the Union Republics or leading Party workers, while the departmental people's-university councils are headed by Deputy Ministers. The absolute majority of district, town and regional Soviets are also headed by leading Party and Soviet workers. Membership of the territorial and departmental people's-university councils includes, on the one hand, competent and interested high-level representatives of client firms and undertakings and, on the other, highly qualified specialists in national education with experience in adult education.

Through the development and improvement of their work the people's universities have achieved great successes. A situation has been created in which, side by side with the State system for improvement of qualifications, they have become the standard form of supplementary education. Instruction in them can, in theory, go on in parallel with instruction in the general- and special-education subsystems, but its principal sphere of activity is the post-graduate period.

In the future system of lifelong education the people's univer-

sity will become the intermediary, so to speak, between the individual and the whole immense wealth of knowledge that has been and is being accumulated by mankind. It will be called upon to provide access to knowledge of every kind, and, in order to do so, it will have to fulfil a great variety of functions. We shall consider the three most important of these functions here.

(a) *The information-consultation function.* A student entering a people's university by no means always knows exactly what knowledge he needs and what are the best ways of acquiring it. This applies to all three areas of the work of supplementary education mentioned above (page 104). The university must therefore be ready to compile, in collaboration with the student himself, an individual syllabus for the improvement of his qualifications, on the basis of the demands of his firm in terms of specific work and of the job prospects of the student concerned. At the same time, let us suppose that this same student has been selected for a group of voluntary law-and-order workers, and that he needs a set of at least the primary facts required for the performance of this public duty. Moreover, his wife has just given birth and he would like to learn something about bringing up children. Finally, this same student, who may for example be an engineer by trade, has long been interested in the history of his native region and would very much like to follow a regular course of lectures on this subject, designed for a comparatively well-informed listener.

After considering all these requirements, the advisory service of the university must translate the requirements of the firm and the wishes of the learner into a definite individual syllabus, which will take account of the educational level of the student in the required fields and will be calculated over a certain period of time. It will comprise a set of subjects arranged in sequence, with an indication of the number of hours of study necessary for each. The syllabus will also indicate which subjects can be studied in the university concerned, what knowledge can be acquired in other teaching institutions, what can be acquired through consultants, and what must be acquired independently.

In other words, the people's universities must act, in a sense, as "information bureaux", to which individuals can apply in

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order to obtain the best possible advice about possible ways of satisfying their learning requirements and inclinations.

(b) *The teaching function.* The working experience accumulated by almost 50,000 people's universities shows that they can successfully cope with the most varied teaching problems and provide training at virtually any level (from the introductory to the highest professional level) in the broadest range of disciplines. The ability to take account of the special learning requirements of an adult clientèle, the active involvement in the teaching work of highly qualified teachers and specialists, and their capacity to react swiftly to the demands of students, by literally changing their teaching syllabuses as they go along—these are the features of people's universities that have led to their immense popularity among a fifteen-million-strong army of students. These features also confirm our conviction that we can rely on the people's universities as the basic link in the chain of supplementary education. Nevertheless, even universities of a broad type cannot satisfy, by their own unaided afforts, all the learning needs of students.

(c) *The organization-supervision function.* The need arises, therefore, for a people's university to organize some of the learning activities of its students outside the university itself. This learning can take the form of classes in institutions of general or special education, in other people's universities or on special courses, of visits to lecturing bureaux, of work with individual tutors, or of some other kind of study. Instruction may be through direct attendance or by correspondence, over short or long periods of time, as part of a group or individually—in short, by any means which is suitable and convenient for the student. The people's university must also assist in organizing this instruction, since it is precisely the staff of the university who are expected to be in touch with where, what and how a student can learn; it is for them to select, in agreement with the student, the most suitable of the available varieties of instruction (an essential condition for successful supplementary education); and it is then the responsibility of the staff, after contacting the necessary educational institutions or advisers, to give the student a genuine opportunity to obtain the required knowledge and skills, and to

ensure that the information received from both outside and inside the university is properly co-ordinated.

Organizing the process of obtaining knowledge, however, is only one side of the coin: the process must also be supervised and tested, to assess the level of training received. It may seem that in the case of adults studying what they themselves require the need for testing, even if it does not disappear entirely, may be considerably reduced; but this is not entirely the case. Quite apart from the extremely valuable disciplining, organizing and stimulating influence that tests have on learners, there is a direct need for testing in those quite frequent cases in which learning "for oneself" is also "learning for society", where an ordinary individual interest in a particular subject is transformed into some kind of socially useful activity for which a certain educational status is required. A person's interest in the history of the town where he was born, for example, may develop into the desire to work as a guide in his spare time; in another individual an interest in jurisprudence takes on a different meaning when he is proposed for a post as a people's assessor, which calls for certain legal qualifications.

The people's universities must therefore carry out a testing function, by which they translate a set of courses into a particular qualification. As far as the subjects taught in the university itself are concerned, this presents no problem. In the case of subjects studied outside it (even though, as a rule, on its recommendation), it is necessary for examinations to be taken, either at the place of study, or at the university itself using questions or papers provided by the organization concerned. In the latter case the university acts in an intermediary rôle, setting up the "examination situation" in which the student is invigilated while he answers the questions provided; the written answers are then sent to be marked by the institution or organization where the student received the training. All the results obtained are recorded in the student's individual "education record", and when he attains the necessary level in the required range of subjects the institution or organization concerned awards the qualification that he has merited.

The people's universities should become the centre of the supplementary-education subsystem. In addition to their direct training activities, they should take on the responsibility of act-

ing as the connecting link between the requirements of society, the potentialities of the education system, and the demands of individual students. Essentially, all three of these elements are in pursuit of a single aim: the all-round development of each individual; but it is precisely the people's universities that must determine the most appropriate ways to achieve that aim in each particular case.

This is an exceptionally complicated and many-faceted task. But the people's universities have many acknowledged qualities: the amazing flexibility and adaptability of their work; their capacity to work with almost any student population and to involve the most varied and most qualified teachers and specialists in their teaching work; their widespread use of the whole arsenal of modern aids in teaching and adult education; and the innumerable examples of individual work with students. All these qualities inspire us with confidence that this form of supplementary education, suitably developed and improved, is capable of successfully fulfilling the functions we have described.

This proposed outline scheme for a lifelong-education system in the USSR is one of the first attempts of its kind and has its inevitable shortcomings. The author recognizes that the structure outlined here may seem ill-founded and unconvincing; it may provoke comments and suggestions as well as controversies and objections. All this, however, will help to bring the scheme closer to a state of perfection.

In the last analysis, our supreme task is that of making the increasingly powerful stream of new scientific knowledge, that is bursting the banks of basic education, available for systematized acquisition. This, of course, is possible only on the basis of fundamental notions acquired during basic education, and only in conformity with the specific learning needs of each individual, both in his working life and as an active citizen with increasingly positive spiritual and cultural requirements. The swift increase of scientific knowledge, and the urgent social need to accelerate the practical utilization of that knowledge, have rendered all the former possibilities of self-education insufficient or ineffective. Only an all-embracing system of lifelong education can today

offer a reliable tool for keeping in sight the ever more rapidly receding horizons of knowledge.

The basic-education subsystem in the USSR, as we have seen, is already adjusting to the new learning situation, with a clear sense of purpose. The supplementary-education subsystem of lifelong education, like the whole of lifelong education itself, is still in search of an ideal scheme. An outline of such a scheme is here submitted for discussion.

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The book

The scientific and technological revolution is placing fundamentally new demands on education. Alongside the daily increasing convergence of science with production there is an equally growing need to combine education with work and also to extend education beyond the duration of formal schooling and into the working period of life. Education is thus losing its meaning as solely a preparation for what lies ahead. It must become instead an instrument for a person's constant cognitive adaptation to both the increasingly rapid renewal of scientific knowledge and to the quickening pace at which this renewal is transforming industry and the content and form of employment itself.

The author argues that the existing traditonal school education system is in need of some restructuring and of some "supplementary" education which should merge with basic education to form a single lifelong education system. Such a system, by reacting flexibly and dynamically to the achievements of science, can become the instrument enabling man to adapt to the whole range of the changes which the scientific and technological revolution is producing in all spheres of human activity.

The creation of such a lifelong education system has been acknowledged as a primary task of importance for the Soviet Union and in this booklet the author outlines a possible structure and functions for the system.

The author

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